RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.

PUBLISHED EVERY FRIDAY BY THE RAILROAD GAZETTE AT 83 FULTON STREET, NEW YORK
BRANCH OFFICES AT 375 OLD COLONY BUILDING, CHICAGO, AND QUEEN ANNE'S CHAMBERS, WESTMINSTER, LONDON

EDITORIAL ANNOUNCEMENTS.

THE BRITISH AND EASTERN CONTINENTS edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages of the Railroad Gazette, together with additional British and foreign matter, and is issued under the name Railway Gazette.

CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

CONTENTS

EDITORIAL:

Grade Crossings in New York State..... 109
Mr. Ripley on Two-cent Fares 109
Revision of the Standard Code..... 110
Train Rule No. 4. 110
Hocking Valley Consolidation..... 110
Virginia Two-cent Fare Law Invalid.... 111
New Publications 112

ILLUSTRATED:

Great Northern (Eng.) Diamond Jubilee 117
Modern Scientific Lubrication..... 118
Parker System of Car Heating..... 122
Uniform Live Loads for R. R. Bridges... 123
Schmidt Superheater 124
Chinese Railroads 125

CONTRIBUTIONS:

Braking Power for Freight Cars..... 112

MISCELLANEOUS:

Wrongful Diversion of Cars 112
The New Standard Code 114
Railroad Engineer's Note Book 119
Deformation of Railroad Tracks. 128
New Southern Pacific Steamships. 128

FOREIGN RAILROAD NOTES:

Cape to Cairo Railroad .....
Record Speed in Hungary 116
News Service on French Railroad ....

Belgian Government's R. R. Property...
New Italian Minister of Public Works... 128
Rates on Japanese Goods in Manchuria..

GENERAL NEWS SECTION:

Notes 33
Trade Catalogues 35
Obituary 35
Elections and Appointments 35
Locomotive Building 36
Car Building 36
Railroad Structures 37
Railroad Construction 37
Railroad Corporation News 40

VOL. XLI., No. 6. FRIDAY, AUGUST 10, 1906.

Last year, in New York state, 172 persons were hit by trains at grade crossings and 96 of them killed outright. This is nearly 10 per cent. of those who died in the state from old age during the same period, so that it seems desirable to fix the responsibility on those who are competing with Father Time in mowing people down. It is impossible for the railroad companies to stop this killing at grade crossings. With all possible precautions the number will tend to increase, rather than diminish, as electrification progresses and the number of trains increases. It is not difficult to determine the responsibility for these deaths. The New York state law prohibits any new steam railroad construction, or street opening, involving a crossing at grade. It undertakes to gradually eliminate all grade crossings by providing that the railroad company shall pay one-half the cost, the city or town one-fourth and the state the remaining one-fourth. The law says: "The legislature shall annually appropriate out of any moneys not otherwise appropriated the sum of $100,000 for the purpose of paying the state's proportion of the expense of a change in an existing grade crossing," but it also provides that balances in any one year, not expended for this purpose by the State Railroad Commission, lapse and cannot be used in following years. The appropriation of $100,000 a year is mandatory, while it is permitted to appropriate additional sums where towns and cities join with the railroads in asking for it. The responsibility for failure to carry out the intent of the law does not rest on the railroads. In no case, so far as we know, have they been reluctant to either elevate or depress their tracks through cities and towns. The people, represented by their legislators, are not to be blamed, for the appropriations have been made. The cities and towns have not been at fault, for they have shown a strong desire to pay their quarter of the cost of lifting or depressing the track to the end of stopping the killing and obstruction to street traffic and increasing the value of their property. It is the more obviously to the interest of the city or town, because the cost of getting rid of grade crossings includes the cost of adjacent street improvements, which is usually much greater than the city's contribution to the total expense. Who then is guilty? In 1902, 1903 and 1904 the then Governor vetoed nearly every appropriation made for this purpose by the legislature. Hindrance to the state's prosperity and the loss of human life meant little to him while political necessities held his watchful eye.

The New York State Railroad Commission has statistical, executive and judicial functions, the first of which is performed by its clerical staff, the second left undone and the third occupying (a conservative estimate made from its annual reports) about forty days a year, for which each member receives $200 a day, inasmuch as the yearly salary is $8,000, paid by the state, but assessed on the railroads. Of its five members each one was appointed for political reasons only. Not one member of this commission, which has power over life and death, and whose decisions are final, has been appointed for fitness. Its president was long chairman of the Republican state committee; another had to be "taken care of" when he left his place as Superintendent of Public Works badly stained by the wasteful expenditure of $9,000,000 on the Erie Canal; a third was dramatically taken at Albany from the train, of which he was a conductor, and led to the Governor to receive a certificate showing that his income was increased about 500 per cent. This increase of pay was properly dwelt on by the good conductor and by the reporters as being the most important part in the making of a new railroad commissioner, for, aside from the little time perfunctorily given to formal performance, balancing good and bad, the payment made for net valuable services may be computed at something like $8,000 a second. Their decisions are what might be expected from a commission so composed. For example, two different electric lines lately applied for permission to cross steam railroad tracks at grade at Niagara Falls and at Nepperhan. The topography made both crossings dangerous and earnest protests were made. The application was granted and up to date one man has been killed at each place.

Mr. Ripley's letter to the people of Kansas protesting against their agitation for a law limiting passenger fares to two cents a mile is a masterpiece, and we reprint it in full. If his facts are fairly stated—and they seem fair—his argument is unanswerable. There is a theoretical weakness in his position, in that the company's gains and losses, its wise acts and its mistakes or impositions, are spread over eight or ten states, and Kansas neither benefits by all the good things nor suffers from all the bad; but it is only theoretical—for practically the state, or any state, in dealing with an interstate railroad must be guided by those standards which are tangible and manageable, and these Mr. Ripley has set forth very clearly. This inability of a state to discipline a great railroad in all its doings is inherent in our federal form of government and the provisions of the Federal Constitution. If Mr. Ripley were to charge passengers five cents a mile in Arizona and two cents a mile in Illinois, it might or might not affect the people of Kansas; but they could not fairly do anything about it, and in either case their interest lies in close attention to those conditions (in their own state) which they can deal with. Nothing is clearer than that the people of Kansas get in passenger service more than they pay for. The railroad may fairly insist on making this fact

prominent. If the Atchison has taken too much money from the people—and no evidence is presented that it has—it has been on freight, not passengers; and freight rates would be the ones to be reduced. In fact, the only rational plea that the agitators for the universal two-cents-a-mile rate can offer in any state is that the railroads are doing well and ought to divide with the people. The problem of changing passenger fares is simple in form—while freight rate problems are always complicated—and so the demagog seizes on it as one of his most useful weapons. Always, in the past, cases of this kind, unfortunately, have been decided, not by full and frank argument such as Mr. Ripley now offers and asks for, but by appealing to local patriotism and prejudice or bald and short-sighted self-interest. It will be a most hopeful evidence of progress in civic intelligence if this appeal shall be shown to have an appreciable effect.

The revision of the standard code of train rules that was made at the last convention of the American Railway Association is destined, probably, to stand mostly unchanged for some years. Like its predecessors, however, it requires a good deal of fixing up to fit it for use on any individual road, and we have therefore asked Mr. Forman to write out his ideas of how to do this. His article begins on another page. The Association committee almost of necessity leaves many things for the individual manager to attend to for himself in the final preparation of the code for use, but each of these details demands thoughtful attention, and the counsel of such a student as Mr. Forman is therefore of special value. He is by far the most thorough and discriminating critic who has dealt comprehensively with the standard code, and his standing as a critic is founded on long and valuable experience. He has lately taken part—and, we judge, the chief part—in editing the code for the Nashville, Chattanooga & St. Louis Railway, and the new N., C. & St. L. code shows that his ideas, as expressed in his book on Rights of Trains, have been quite generally adopted by the company. As the Nashville, Chattanooga & St. Louis is not a road to accept anybody's ideas without careful testing, this adoption is a significant testimonial to the excellence of Mr. Forman's work. Among the most interesting paragraphs in the present article are those on Rules 88 and 90 and on Rule 29, though the matter of a time allowance between opposing trains of the same class at meeting points seems to be one in which the N., C. & St. L. did not agree with Mr. Forman sufficiently to put his idea in practice. This disagreement well illustrates the need, even now, after nearly twenty years' trial, of thorough investigation of rules on the part of every superintendent on whom falls the responsibility of introducing or modifying a code. And this need is shown still more clearly when we consider that the weak point in Rules 88 and 90 which Mr. Forman brings out has existed, before the eyes of everybody, these many years. That no collision has occurred because of this weakness is no answer to the present criticism, for many a dangerous rule has gone unnoticed for years on busy roads.

In the present standard code, the product of so much cautious collaboration, there is scarcely a rule which it would be safe to call more important than another, for the violation of almost any one of them may be the cause of a collision. Certainly we do not mean to intimate that the two subjects mentioned—88-90 and 29—are more important than many others. But Rule 4 may fairly take the first place in one respect. It produces the largest volume of controversy. It surpasses in this respect the famous flagging rule, No. 99; for while both 4 and 99 were subjects of strife in the early days of the code No. 99 has now become quiet. No. 4, however, still rages. As the action of the N., C. & St. L. on it will give a practical turn to the discussions which have been going on for the past year or two we may expect still further invoices of fine-spun arguments. As far as they have to do with propositions to take action in real life—that is, with rules which a railroad company intends soon to adopt in actual service—we shall welcome these arguments. We take an interest in them, because we formerly lived on that same low level ourselves! Train rules constitute a fascinating subject, and Rule 4 is one of the fascinatingest features of the subject. But we are free to confess that our love for such discussions is based largely on our love for the men who do the discussing; that is, for our dear neighbors, in Tennessee and elsewhere, whose practice compels them to still treat Rule 4 as important. Also, we have a profound respect for the past. But in the twentieth century the only rational scheme of train running is that which employs the block system everywhere, and by so doing makes Rules 4, 99 and others over which there have been so many days and nights of discussion, no more important as safety measures than the waiting list of extra brakemen; that is, of no importance at all. Some of our train rules—this No. 4, for example—come pretty near being a combination of comedy and tragedy. In our attempts to provide by rule for a complication of circumstances that would tax the ingenuity and patience of the Supreme Court, and in our innocence in entrusting the execution of such a rule to a hundred poorly trained freight conductors we approach the ludicrous. In the results of such action we see, or may expect to see, unnumbered tragedies. Rule 4 and all other rules must be made as perfect as possible, as long as the necessity exists for their use; but let us hasten to do away with such a burdensome necessity.

THE HOCKING VALLEY CONSOLIDATION AND THE MINORITY STOCKHOLDER

There was announced on Monday of this week the plan for the consolidation of the Hocking Valley Railway Company and the Kanawha & Michigan Railway Company, two bituminous coal roads in the West Virginia and Ohio territory which have for some years been closely associated both physically and in control, the Kanawha & Michigan forming the southern connection into West Virginia of the Hocking Valley, with $4,510,000 of its $9,000,000 capital stock held by that company. The consolidation plan as now presented to the stockholders of these two companies in brief provides for a new issue of $30,000,000 in 4 per cent. bonds and $13,750,000 in stock by the consolidated company. Of the new bonds, $17,000,000 are to be issued in connection with the consolidation. Of this amount $16,500,000 are to be exchanged for Hocking Valley preferred stock at the rate of $110 in bonds for $100 in stock. The purposes for which the additional $500,000 bonds are to be issued are not stated. The $11,000,000 Hocking Valley common stock is to be exchanged, share for share, for stock of the new company. Of the remaining $2,750,000 stock in the new company, $2,694,000 is to be exchanged for the $4,490,000 Kanawha & Michigan minority stock outstanding in the hands of the public, or at the rate of $60 in stock of the new company for each $100 of Kanawha & Michigan stock. It is understood, though not so designated in the announcement, that with the funding into bonds of the Hocking Valley preferred stock, the stock of the new company will pay 6 per cent. instead of the 3 per cent. now paid on Hocking Valley common. At the current price of about 125 for Hocking Valley common, this would indicate a value of $75 a share for Kanawha & Michigan stock under the consolidation plan.

This favorable valuation of Kanawha & Michigan stock, which on May 26, 1905, sold as low as $29.50 a share, was brought about only by determined action on the part of Kanawha & Michigan minority stockholders. Control of the Hocking Valley itself through ownership of a majority of the common stock is held by the trunk line railroads, with Pennsylvania interests controlling one-half and the Chesapeake & Ohio, the Lake Shore and the Erie each, one-sixth. With the large increase in Hocking Valley earnings which resulted from the recent and present prosperity of the soft coal trade, it has become more and more desirable to these interests to increase the dividends on the common stock held by them. By the provisions of the organization adopted after the foreclosure of the Columbus, Hocking Valley & Toledo in 1899, the preferred stock is entitled to share equally with the common in any dividend above 4 per cent. on each class of stock. Therefore as the investment of the interests in control was in common stock, and the preferred stock was subject to redemption at par, the obvious thing to do, from the standpoint of the majority interest, was to retire the preferred stock. In connection with this action it was understood that the Kanawha & Michigan would be absorbed by the larger road, the figure at which it was expected that Kanawha & Michigan stock would be valued in this operation being considerably below $75 a share.

Led by the probability of such action and believing that a much higher value was inherent in Kanawha & Michigan shares, a committee was in December of last year formed to represent the minority stockholders of that road, $4,490,000 of whose $9,000,000 stock, or $10,100 less than a majority, is outstanding in the hands of the public. The purpose of the committee was stated by it to be to influence the directors to distribute a portion of the net profits in a dividend to the stockholders. Attention was called to the fact that the road had enjoyed five years of great prosperity in which gross earnings had increased from $760,000 to $1,760,000 and that there were indicated for the fiscal

year 1906 gross earnings of over $2,000,000. As a matter of fact the 1906 earnings have proved to be over $2,150,000. There was soon secured the support of more than a third of the total outstanding stock of the road, the proportion necessary under the Ohio law to block any consolidation plan, and direct negotiations with the controlling interests in the property looking to dividends on the stock or, in the event of consolidation, a price considered commensurate with the earning power and resources of the property, were begun. These negotiations lasted for several months and involved a number of important moves on the part of the combined minority interest. For example, when Kanawha & Michigan stock was selling at about $60 a share in the open market, the committee offered the Hocking Valley $75 a share for its majority stock, about $15 more than the market price. This offer was refused and the committee then turned about and offered to sell the stock deposited with it ($2,800,000 of the $9,000,000 outstanding) at a similar price. Neither of these offers were accepted by the Hocking Valley, but late in May an agreement was reached by which the consolidation of the Hocking Valley and the Kanawha & Michigan was to be effected according to the terms of the recently announced plan. With this arrangement, which gave the Kanawha & Michigan stock a value of about $75 a share, a price satisfactory to most of the minority stockholders, the work of the committee came successfully to an end. In a year the stock had risen from a low point of $29.50 and during progress of the negotiations from $38 to over $70.

The Hocking Valley-Kanawha & Michigan consolidation, as influenced by the Kanawha & Michigan minority stockholders' committee, is noteworthy as an example of a successful attempt on the part of minority stockholders to gain a share in arranging the financial policy of a railroad company. The rights of the minority stockholder form an all-too-clouded chapter in legal development. Until a comparatively recent date, this legal obscurity and the difficulty of concerted action on the part of small stockholders has made the average minority stockholder practically helpless in the hands of the controlling interest in his property. The present year is noteworthy in the number of movements by which minority interests are demanding a larger share in the profits and, where necessary, fuller information about the operation of the companies of which they own a part. The action of the minority stockholders in the Wells-Fargo Express Company (though this committee, said to represent 51 per cent. of the stock, can hardly be called a minority interest) and of the United States Express Company for obtaining larger dividends was referred to in the *Railroad Gazette* of July 27, in an editorial article on the express companies. Within the past week a similar committee has been formed in the American Express Company and a similar effort is under way to obtain for all the stockholders more of the profits. Like action is being considered by minority stockholders of the Michigan Central, a road which has for 10 years paid 4 per cent. on its stock and during that time increased its gross earnings from $13,600,000 to $23,200,000.

These attempts to give minority owners a larger share—in certain cases it would not be too strong to say *some* share—in the management of their companies, are distinctly a sign of the times. They are part of the general awakening in regard to "ways that are dark and tricks that are vain" in corporation management. Though it was not possible, as in the case of the express companies, for all real information in regard to the management of the Kanawha & Michigan to be concealed from its stockholders among the general public, there was apparently a good deal not known to them under the old regime. For example, it was made public during the process of negotiation that the controlling Kanawha & Michigan stock was no longer held by the Toledo & Ohio Central (also controlled by the Hocking Valley), but had been turned over to the Hocking Valley itself. The relations of the companies up to the time this became known were supposed to be that the Hocking Valley controlled the Toledo & Ohio Central, which in turn controlled the Kanawha & Michigan. There is inherently nothing wrong in the transfer of control of a railroad from one controlling company to another, and no doubt the transfer was made in all honesty; the morally, if not legally, wrong part of the transaction was that it was done without giving any information as to the transfer to the whole body of stockholders of any of the three roads interested. Of course, the controlling interests in Hocking Valley, who are also the controlling interests in the Toledo & Ohio Central, who are also the controlling interests in the Kanawha & Michigan, undoubtedly knew all the details of the transaction, but the minority stockholders seem to have been left entirely in the dark. The only reason it is necessary to point out the wrong character of such a transaction (we are not necessarily condemning this particular transaction) is because it has been so common for such things to be done without thought or comment. In such a transfer as this the controlling interests deal with themselves in three capacities—as buyer, seller and object of sale. They are, practically speaking, entirely in control, have all the facts at their command, and in general can, if so disposed, arrange matters to their own interest as against the interests of the whole body of stockholders. This is not saying that they generally do this, simply that they have the chance to do it. They ought not to have the chance.

Even with the consolidation plan as now arranged, there is apparently no reason why the common stock should be so highly favored as compared with the preferred, except that the interests which control the property happen to own common rather than preferred stock, and are able under the terms of the organization to retire the issue which stands between them and higher dividends In the nature of things, there is no reason why the charter provision that all dividends above 4 per cent. shall be equally for the benefit of all shares, whether preferred or common, should not have been left in force and the preferred and common stock been allowed to share equally in the future prosperity of the property. Entirely aside from this, however, it appears—though, of course, there is no absolute proof of the assertion available—that it was the intention of the interests which control the three properties to bring the Kanawha & Michigan stock into the consolidation at a very much lower price to the minority owners than that which, under stress of effective opposition by the minority, they have agreed to give for it. Although there may be circumstances not generally known which disprove this conclusion, it seems pretty obvious that at least one-third of the stockholders of the company secured what appear to be their fair rights from the interests in control only by force. This state of affairs in American corporations must be brought to an end before the present disturbing hostility to corporations can be expected to subside.

VIRGINIA TWO-CENT FARE LAW INVALID.

Legislative railroad-baiting has received a decided setback in Virginia. The act passed during the last session of the Virginia legislature requiring roads in that state to place on sale on June 15, 1906, mileage books of 500 miles at two cents a mile has been held to be unconstitutional by the Corporation Court at Staunton and by the State Corporation Commission at Richmond in independent proceedings.

The contention of the roads that the law was void was based on several grounds, but they relied principally on two points. The first of these was that the Constitution of Virginia has divested the legislature of power to prescribe rates by the provision that "the authority of the Corporation Commission, subject to review, on appeal, to prescribe rates, charges and classification of traffic for transportation and transmission companies shall be paramount, but its authority to prescribe any other rules, regulations or requirements for corporations or other persons shall be subject to the superior authority of the General Assembly to legislate thereon by general laws." The second principal point was that the law was in violation of the Fourteenth Amendment of the Constitution of the United States in that it would deprive the railroad companies of their property without due process of law.

The Corporation Commission and the court both found the law to be unconstitutional and void on the ground that it was in violation of the Fourteenth Amendment, both decisions being based principally upon the decision of the Supreme Court of the United States in the case of Lake Shore & Michigan Southern Railway Company vs. Smith, 173 U. S., 684, in which it was held that a similar law enacted in the state of Michigan was in violation of the Fourteenth Amendment. In that case the court said: "The power of the legislature to enact general laws regarding a company and its affairs does not include the power to compel it to make an exception in favor of some particular class in the community and to carry the members of that class at a less sum than it has the right to charge for those who are not fortunate enough to be members thereof. . . . Regulations for maximum rates for present transportation of persons or property bear no resemblance to those which assume to provide for the purchase of tickets in quantities at a lower than the general rate, and to provide that they shall be good for years to come. This is not fixing maximum rates, nor is it proper regulation. It is an illegal and unjustifiable interference with the rights of the company."

The Corporation Commission did not find it necessary to pass

upon the contention that the Virginia legislature had been divested of power to prescribe rates, but Judge Holt, of the Corporation Court, denied that this was true, in an interesting argument in which he held in effect that this power resided in both the legislature and the Corporation Commission, but that the authority of the latter was paramount to that of the legislature.

This Virginia episode is interesting chiefly as illustrating the tendency of legislatures and the public, following the example of one high in official life, to seek to override the laws and the courts in their hysterical campaign against corporations. The Virginia legislature might have been excused for believing it had power to enact the Churchman law if the case of the Lake Shore & Michigan Southern vs. Smith had never been decided, but the evidence is conclusive that the members of the legislature knew this law was in violation of the Constitution of the United States and that they persisted in passing it for the sole purpose of being able to pose before their constituents as champions of "the people" against the corporations, leaving it to the courts to take the responsibility of making an unpopular decision in upholding the well-established law of the land. Not only were the Smith case and other cases bearing on the constitutional question thoroughly threshed over in the legislature, but the member who introduced the bill admitted before a legislative committee that he knew it was unconstitutional.

Then, following the enactment of the law, when it became apparent that the railroads, relying on the fundamental law of the United States, as interpreted by the Supreme Court, proposed to ignore the unconstitutional and invalid enactment, a campaign of violent abuse was inaugurated and was participated in by the press of the entire state, with few exceptions. The railroads were denounced as law breakers and as defying the laws of Virginia. It might be pertinent to ask in this connection whether the real lawbreaker in such a case is not the legislator who knowingly seeks to violate the fundamental law under the forms of legislation?

NEW PUBLICATIONS.

Universal Directory of Railway Officials. Edition of 1906. 626 pages. Cloth. Published by the Directory Publishing Co., Ltd., 3 Ludgate Circus Building, London, E. C. Representative for the United States, A. Fenton Walker, 143 Liberty St., New York. Price, 10 shillings.

This is the twelfth year of existence of this very convenient and valuable publication, which gives a good list of the railroads of the world, compiled from official sources under the direction of S. Richardson Blundstone, editor of the *Railway Engineer*, together with a list of the officials of each road, and statistics of mileage, gage and equipment. No other single publication can take its place for reference purposes merely with regard to the physical characteristics of the railroads, while the list of officers is, so far as we know, entirely unique.

CONTRIBUTIONS

Baltimore, Md., July 25, 1906.

To the Editor of the Railroad Gazette:

What considerations led the Master Car Builders' Association to fix 70 per cent. of the light weight of the car, as the braking power for freight cars? I am of the opinion that a braking power equal to the weight of the car can be used, if the co-efficient of friction of the brake-shoe on the wheel is made equal to that of the wheel on the rail. WILLIAM REDPATH.

[The object of limiting the braking power to 70 per cent. of the light weight of the car is to prevent the possibility of wheels slipping on the rails and wearing flat spots. Slight variations in the leverage of the brake rigging, variations in the cylinder pressure assumed in calculating the braking power and varying conditions of the rails must all be taken into consideration and some allowance made. A margin of 30 per cent. is found in practice to be about as small as can be allowed. It is obviously impossible to make a brake-shoe having the same co-efficient of friction at all times and with all wheels as that between the wheel and the rail.—Editor.]

Wrongful Diversion of Foreign Freight Cars.*

Mr. Daly (Ill. Cent.).—As a member of the committee, I will explain the conditions. During the time that mileage was in effect it was practically a rule for the roads to exchange cars for return loads. In other words, the road originating traffic called on the receiving line, or the road to whom they delivered the traffic, to put in their quota of the cars necessary to handle the joint traffic, and they did it. The originating roads also demanded a transfer of their cars when loaded with commodities that would stand transfer, and the receiving road transferred the freight.

Next came the Per Diem Agreement, and with that all of the old practices went out of use. The road receiving traffic from another road figured that the road originating must put its own cars into it; must deliver them to the receiving road and let them go through regardless of what effect it might have on their own local business, and the road receiving the traffic did not consider that they were under any obligation to participate in furnishing cars for the return traffic. The result is, that the roads originating grain, cotton, lumber and all low grade commodities of that kind, are today obliged to furnish practically all of the cars necessary to take care of the business, and let them go through. During the months of October, November, December and January last, we had 22,000 Illinois Central cars on the tracks of foreign railroads at all times, and we had an average of from 10,000 to 11,000 foreign cars on our rails. We have built 60,000 cars, which is ample to take care of our business, and to put in our share of cars for joint traffic with our connections. Still we went through that four months with 10,000 less cars than we own, and the connecting lines to whom we delivered good-paying revenue (either they or the connections beyond them), took this surplus 10,000 Illinois Central cars, and either used them locally or in joint traffic with others. The result is that we lost thousands of dollars in revenue, and we lost thousands of dollars on the investment we made in those additional 10,000 cars which we did not get the use of.

We considered thoroughly the question of a penalty for diversions. I will say, frankly, that I could not, with four times the force I have to-day, detect 50 per cent. of the diversions we made last year of foreign cars on our own road if we wanted to voluntarily report it to our connections; and what opportunity would we have of detecting diversions on other railroads? For example, we load a car to Philadelphia via the B. & O., the Pennsylvania or the Lake Shore, and the Lehigh Valley and Central of New Jersey. When that car reaches Philadelphia and begins to bob around on the B. & O., Pennsylvania, P. & R., or Central of New Jersey, how would we detect the diversions? It is a physical impossibility. The car might be loaded to St. Louis, Louisville or Cincinnati. It would appear to me and also to an ordinary clerk that there was a diversion. The road which loaded it back into St. Louis, Nashville, Chattanooga, or some point in the direction of home, would maintain that it did not divert the car. Again, the application of a penalty rule of that kind has never been successful. It simply means that the agent who is working for the interests of the company, routing the car in a way which he thought would be stretching the rule a little, but not seriously putting the car out of line, would be assessed this one, two or three dollars, as the case might be. That immediately puts bad blood between the agent and the company. The agent thinks the company is not his friend; is fighting him; and the result is, a penalty rule of that nature could not be successfully enforced.

Now, the suggestion was made of establishing limits, where certain roads' cars should be transferred. That, the committee found, would be impracticable, for the reason that a traffic line like the Pennsylvania, or the Vanderbilt system which extends over and covers the local territory in Illinois, could originate grain and let it go through on their line without breaking bulk; and if we undertake to enforce a transfer at Chicago or Buffalo against another road, for instance the Lehigh Valley or the Nickel Plate, it would create a hardship on those two roads and they could not compete with the road that did not transfer. So that would, from a traffic standpoint, shut out the recommendation of keeping your cars within a given area. At the same time the committee fully appreciated the fact that the owner of the car must necessarily be protected in the enjoyment of the use of its cars, or by a car of equal value from the other road. Your committee have not deemed themselves big enough or wise enough to lay down any particular plan—the pooling of cars or any other specific proposition. We have simply placed before you the conditions as they exist. In the past two years all railroads without exception have handled cars regardless of ownership, and it has got to such a point that the roads building equipment must necessarily look to us to take some action to break up this practice. The committee thought that by bringing it before you and exposing it, the gentlemen present could formulate in some manner a recommendation to the American Railway Association Committee, to attach to this report, that would tend to break up this practice. The executive officers of railroads must soon call a halt on the pernicious manner in which roads are handling other peoples' cars. We all admit guilt; we are all bad, and there is justice in the recommendation of this committee, that the railroads exchange cars equally between each other. That is a recommendation that we can all work to. It is no hobby. If we deliver to the Lake Shore at Chicago on December 1 50 loaded box cars—Illinois Central, Lake Shore or whatever they are—we naturally expect the Lake Shore to return us an equal number of

*Extract from discussion at the last meeting of the Car Service Officers (Denver, May 17).

cars; and in that way let the Lake Shore protect its own business. I might say that the originating roads, especially in the central and western field, are going to be up against it with the state authorities. Not only there, but also in the south. The states of Minnesota, Iowa, Missouri, Ohio and Louisiana have up the question of reciprocal demurrage. In Iowa the bill was to assess demurrage against the railroads on the basis of a dollar a day for failure to furnish cars within three days after being ordered. Now if we are to be fined a dollar a day for failure to furnish cars within three days after they are ordered, and the cause of the failure is due to the fact that the roads we are giving this traffic to are holding or misusing our cars and refusing to give us an equal number of their cars to protect us, the roads must then arbitrarily take the position, in self-defense, that you must transfer the stuff; but how much better it would be if the B. & O., Lake Shore, Erie and other roads would come together with the C. & N.-W., C., M. & St. P., Rock Island and other roads at Chicago, and say, "We are willing to meet you half way on this. Instead of transferring your cars we will give you 50 of our cars for every 50 of your cars you give us. Then we are protected and you are protected, and it is not necessary to penalize anybody and create a thousand times more confusion than we have now."

Mr. Bell (P. R. R.).—The Pennsylvania is building 36,000 cars as additions and as filling vacancies for old and low capacity equipment. We will have retired at the end of this year as out of service 16,000 old cars, and we will have new standard 100,000 lbs. capacity cars in service to take their place. The tendency in the last year has been that these cars get away from home and do not get back, and we are losing more of them every day. We have lost 2,000 of them in the last 30 days. We cannot go on improving our equipment and building standard cars, and have less cars to do the business on our own railroad. We cannot possibly continue business on that principle. I do not know what to suggest as a remedy. Our people are very much exercised about this question, and why should they not be? There has got to be a change of some kind. Mr. Daly has explained the whole situation in a very excellent way, but what are we going to do about it? The Illinois Central is not going to keep on building standard cars forever, and let them go away and be used at 20 or 25 cents a day. We are going to be up against this California proposition in a very short time. If they ever build San Francisco up again, which I understand they are going to, they will need a great deal of structural iron, and where is it going to come from? Largely from the state of Pennsylvania, and originating largely on the Pennsylvania Lines. Who is going to furnish the cars to take it to the Pacific coast? If we are going to furnish most of the cars to take that iron to the Pacific coast, and have them tied up there for months, we cannot do business at home. We might transfer it, but that is expensive business. I do not know that we ever could do such a thing, but there are some of the big roads thinking about something of this kind. It is the only remedy they can think of. Whether the business would ever stand for such a thing as that I don't know.

Mr. Beecham (C., M. & St. P.).—When cars have become plentiful, we have become exceedingly virtuous, and we are just as strictly opposed to the diversion of foreign cars on our road as anyone could possibly be, but we have educated our agents in bad ways. They have gone astray, and now it is going to take considerable time for us to get them back into line again. It takes a good while for instructions to permeate a system of 7,000 miles of railroad, and I presume that just about the time that we get those fellows eductaed up into proper ways of handling foreign cars, then a busy season will come on and we will let down the bars, and away they will go. That has been the practice ever since I knew anything about the handling of cars. Bell has referred to the proposition of making transfers, but he thinks that that will never be done. I agree with him. The business will not stand for it, and the road that undertakes to insist upon transfers will perhaps find itself with plenty of cars on hand and also with little business.

I do not believe in a penalty. The thing that we are trying to remedy is too great. An exchange of cars might possibly be the remedy for this trouble, but unless district car distributors are appointed and general distributors, there will not be anybody to see that the rules are carried out any more than they are now. The traffic will continue to distribute the cars in the future as it has done in the past. There is no question about that. The only way that I can see to prevent the distribution of cars by the traffic is to appoint umpires, or car distributors; men whose mandates must be obeyed; men who will know what the situation is on every railroad in this country, in a general way, and men upon whom every railroad can call for assistance when they need it. Those are the men, and only the men who can force the cars against the prevailing tide of traffic; and if such an arrangement as that could be brought about I think there might be some hope of a remedy being found for the trouble, but I am utterly unable to see any other way out of it.

Mr. Wrenne (N. C. & St. L.).—The suggestion that a road receive and return to a road an equal number of cars is impracticable at times. You cannot get as many cars back as you deliver at all times. We have not been able to do it for years past.

Mr. Daly.—The expense of maintaining a car and depreciation of a car is at the present time practically $144 to $150 per annum. For four months the 20 cents a day you get amounts to about $25 in per diem rental for that car. Now, during the remaining eight months of the year we do not need these 10,000 cars. We have no use for them. We have lost their use for the year, consequently we are out approximately $100 to $125 at the very least on each car, and confiscation and diversion of these cars has caused us to lose nearly a million dollars on the investment, as we get little if any return traffic in these cars. They come back empty when the busy season is over. The remedy to apply is to raise your per diem rates to a point where they will compensate the owner for his equipment during the busy season, for which period it was constructed. Why could not the American Railway Association set a date that would strike the beginning of the busy season for railroads throughout the country, on which date the rate per day per car would be increased, say to 75 cents or $1 for every day you have a car, and waive the penalty, that dollar a day for four or five months being sufficient to compensate the owner for building a car when he is deprived of the use of it. When the business gets dull, then drop down to 20 cents a day, in order to prevent creating the necessity for transferring freight to avoid settling on the high basis. The result of that would be that the railroads that have been living on other companies' equipment and doing business during the busy months with cars against the owners' wishes, and giving them no return traffic in the cars, would find it to their advantage to build equipment to take care of themselves during the busy season. If everybody does that, then you have free interchange of cars. But your committee have not considered it advisable to recommend that proposition, for the reason that it will take two or three years to put it into effect, and in the meantime we have lost two or three more million dollars waiting for it.

. . . If you undertake to transmit that power of handling the cars over the different systems to an outside party, who cannot possibly get a regiment of help around him to make him familiar with it, I am sure in 30 days two-thirds of the principal roads going into it would pull out of it. Each road itself is going to handle its own business. It is going to do it in its own way, and they are not going to have a clearing house or a pool commissioner to distribute their cars. But if you put the rate so high on per diem as to make it a penalty to hold a car under any conditions longer than necessary, then you have put the arrangement where it should be. If a road wants your car they ought to pay you at least what it is worth. Put the rate up to that point, and make it an object for the man who has the foreign car to get it home, and then you have accomplished what you are after. I would not for a minute consider that any commissioner—I do not care how big his brain or his body is or how big his office force is—could distribute cars for a lot of trunk lines or granger roads satisfactorily for six days, to say nothing of 30 days. He could not get an office big enough for his file cases to put his reports in for information necessary to have to permit him to handle the equipment satisfactorily.

Mr. Kearney (B. & O.).—I think Mr. Daly's suggestion as to an increase in the rate is the best suggestion made up to the present time. The B. & O. built 10,000 cars during the last few months. To-day we have 600 of our cars less on the road than we had a year ago. We are supplying 100,000 lbs. capacity cars for other people to do business in, and we are getting 20 cents a day. We are of course originating the traffic which takes them away from home. Other people get them and they do not load them towards us, and Mr. Hale has requested a recommendation from us of something definite.

Mr. Rawlins (K. C. S.).—The Kansas City Southern Railway origirates a great deal more business than it gets back. We deliver at the Kansas City gateway 100 cars a day, mostly lumber, and the majority of that business goes to roads who have no loading back to us. It goes anywhere from 100 to 1,000 miles away from Kansas City. Would it be policy, or can we expect to adopt any penalty that will have those cars returned to us empty? We have already taken that matter up with our large connections and told them: "We do not expect you to return our cars to us empty when you have loading for them, but we do expect you to even up on the interchange"; and that seems to me to be a very simple matter. It is merely to make good the day's interchange. If the interchange with the Milwaukee road shows a debit of 50 cars per day, let them give us 50 cars, and it will fix it, as far as our road is concerned, perfectly. Not very long ago the Car Service Department was forced to recommend, in answer to the question of what additional equipment we needed, that we could not afford to buy any more box cars or stock cars when we already had more equipment, according to our mileage, than any one of our connections; and if we had 10,000 cars more our experience would be just the same as the Illinois Central.

Mr. Wolff (Penn. Lines).—There has been a good deal of talk about penalty; penalty for diversion. Let the penalty take the form

of discipline toward the employee who is so enthusiastic in obtaining traffic as to wilfully disobey the rules now in existence. Why not try this as a temporary expedient? Many orders are issued in a way that they are not expected to be obeyed. Certainly they are not obeyed. And then again (and I am sorry to say at somewhat rare intervals) orders are issued that are obeyed, and it is possible to issue such an order. Just as sure as I am standing here to-day, it would be possible, within 96 hours, to stop 80 or 90 per cent. of the so-called abuse of equipment of the railroads of this country. While I do not desire to make a motion on this subject, I merely offer this as a suggestion, and repeat, that if the existing law on this subject was enforced by every railroad represented here to-day (and it can be enforced if the proper executive law is placed behind the order), our troubles would cease.

Mr. Tomlinson (P. R. R.).—Years ago our late lamented Vice-President, Mr. Prevost, devoted a great deal of thought to this very question, and his remedy was first, as Mr. Wolff suggested, the enforcement of a suitable set of car service rules; and second, the application of a power to enforce those rules. It is all right to say we will go to our executive officers and induce them to issue positive orders; but to-morrow traffic develops. This road sees a prospect of getting 500 carloads of freight. Will the general manager enforce it? Therefore Mr. Prevost went further, and suggested a rule in which the road complaining of another road holding cars unduly, or diverting, or failing to enforce car service, should have the power under the agreement, to penalize that road, and as he suggested, a penalty of $500 a day might be too small. His thought was that that might be enforced by agreement. And that is the only way you can carry it through.

Mr. Clarke (M. & O.).—I agree with Mr. Bell, that per diem is not high enough. If you put the per diem up to one or five or ten dollars a day, it is easily settled. There is not a man here who cannot get a car home if he wants to. I misuse cars, and so do you, but if you put the per diem up high enough, there is not a man who will lose his job by not sending a car home. It is simply because we do not try. What is the use of going to an executive officer and asking him if we can load a foreign car or not. We, as representatives of the transportation departments, have it all in our hands. We have not the nerve to go to the general manager and say, put it up to ten dollars. If we did, you bet every foreign car would go off your road in 24 hours.

Mr. Drew (Wis. Cent.).—Mr. Daly's suggestion of 50 cents per day, or more in busy seasons, would have a wonderful effect. I think also that if we could by some means put a penalty on the roads who ship our cars back and forth between close neighbors, say for three, five or six months, at very regular intervals of about 25 and 26 days between, it might be a good thing. Maybe you have had some experience in that line. We had about 180 cars that had been off our road so long that we just simply wanted to see them to see if they didn't need to be repainted, and we sent a man to a certain section of the country to see, just for curiosity, what was being done with those cars. He returned last week. He said he discovered a very interesting traffic in that section of the country, which was a short haul, but which was to be equally divided between two or three roads who ran into the country where that traffic originated, and took that traffic out to an adjacent point where the cars would be unloaded. He found that not having very many cars of their own, it was their practice to not only take Wisconsin Central cars, but everybody else's cars, when they got into their hands, and they would use them in that traffic, which was joint, until they got our penalty notice. Then they handed them over to the other fellow and said, now you keep these a little while. In the meantime the other fellow had had some in the same way, and he simply passed his to the other chap. So those cars have been vibrating back and forth there and we have been receiving $6 a month on those cars we bought during the busy season just about a year ago. Nice new cars they were then, and they made one trip over our road and that is the last we have seen of them. Now those gentlemen were very kind when my representative went there, and said: "Well, that is a shame, and we will see that those cars are started now toward home." . . . Plain, simple honesty, fair dealing, is what we want in a great many cases.

Mr. Tomlinson.—I should like to ask Mr. Daly, under his proposed plan of balancing exchange of equipment, if, for instance, he delivered 50 loaded cars a day for a week to the Pennsylvania and got back a corresponding number of empties or loads, and at the expiration of a week the Pennsylvania said to him, "We are out of cars," what would he do? Would he go over and give us the freight, or what would he do?

Mr. Daly.—The friendly working relation which this exchange would bring about would be such as to be flexible. We have recommended no ironclad rules, that would work a hardship on anybody. We simply say to exchange cars equally between the delivering and receiving roads. Now if you have, during the past week, given us an equal exchange, it is up to us to carry you through and protect your loading, and next week when we are down and cannot make good our end, you equalize with us. Any rule is a bad one that is not flexible to meet conditions as they arise. I think the Pennsylvania and Illinois Central, under a good, fair reciprocal exchange would be benefited both equally, in taking care of the traffic, and we could afford to be liberal with each other as conditions arise.

Mr. Tomlinson.—Mr. Daly has not grasped the purport of my question. I assume for argument, that at the expiration of a week his own supply of cars is getting close and he has a lot of freight in sight. He does not want to give it to the P. R. R. because they have no cars to give back. What will he do? Will he divert that to other roads?

Mr. Daly.—When we put in a reciprocal arrangement of that kind the record necessarily kept by both companies would be such as to show to our general manager and our vice-president, if necessary, the conditions existing between us, and if we could not exchange cars as we agreed, it would be a matter for our superiors to take up and handle, and we would always have the information in proper shape to present to them showing these conditions and how often they occur. A great many of our troubles are the result of our not knowing our own business and not knowing the extent to which these abuses exist, either by being too busy or not having a record of them.

Mr. Ewings (N. Y. C.).—I think the day is coming when we will adjust per diem matters with our immediate connections only. The term "diversion" is a very hard one to define, and particularly as applied to the handling of equipment. Traffic conditions to-day in this country are such that no one is capable of properly defining the word. . . . It has been stated that we might exchange car for car at junction points. I would go a step further and exchange by class of cars on a basis of tonnage capacity. I know that it is a radical step. If we should deliver 10 box cars to a given connection, the total capacity of which aggregated 350 tons, we should have 350 tons of box car capacity from that connection that day, or payment at a rate per ton capacity, and that rate should be one that would force a road to pay its debts. I would advocate a cash settlement every day, but with the immediate connection only. To my mind some plan of that kind would make the cars follow the traffic. In whatever section of the country traffic demanded cars, that section would have them. The rate should be one that would be a combination of per diem and penalty; one that if a road does not pay its debts, the executive officials see it in dollars and cents. There is another advantage in a plan of this kind. It would not be necessary to have a standard rate for all classes of cars. It would not be absolutely necessary to have the rate for box cars in the eastern country the same as in the western or southwestern. That could be made a matter of agreement between the interested roads in various sections of the country. I presume in some sections, for instance in this western territory, that at times stock cars are more in demand than any other class of car. Let them have the higher rate. In the east it would be necessary to have the higher rate apply to box and coal cars. I suggest a rate of 1 cent per day per ton capacity. If we deliver a 50-ton capacity coal car to another road, we want a like carrying capacity coal car, or we want a cent a ton per day. It is nothing more or less than a junction settlement of freight accounts applied to exchange of equipment, and it seems to me very simple. I would like very much to have the committee consider it.

The New Standard Code.

BY H. W. FORMAN.

Daniel Webster himself could not have asked for a more intelligent and discriminating audience than was assembled at the Auditorium Hotel in Chicago at the April meeting of the American Railway Association; but only one short talk was forthcoming. Either the work of the committees was so well done as to require no criticism, or the higher officials present had other problems to take up their minds and were in a hurry to get home. If any one expected to hear the proposed revision of the standard code talked over he had to go home with his thirst for knowledge unappeased.

If the code is "a mere statement of principles, which railroads may elaborate upon and amplify as their circumstances may seem to demand," the rules are now in much better shape than ever before, and if changes or amplifications are made with due regard to harmony with the general principles, they can be applied anywhere. In suggesting some amplifications I shall consider some rules that I have previously discussed, as it is my intention in this paper to consider the whole code.

At the end of this review I shall present a summary in which the rules discussed will be printed in full. Those rules of the standard code, which are omitted or passed without comment, are satisfactory.

To require all meeting or waiting orders to be addressed in duplicate to the operator at the meeting or waiting point is the best practice, but unless the despatcher can find time to properly issue such orders the result of adopting such plan will be disappointing. Those who contemplate using this rule should not lose

sight of the fact that the work of despatchers is thereby increased about one-fourth.

The form for putting rules in effect says that "special instructions may be issued by proper authority." As men are often in doubt about the order in which instructions should rank, I have dealt with this matter in a separate rule, No. 102. It is generally held that special instructions, strictly speaking, can be given only through the medium of a time-table. Matter posted in bulletin books should not be regarded as special instructions, though it must be obeyed just the same as if it was.

As newly employed persons may not be aware of the existence of a rule book, Rules A, B and E would look better if revised and consolidated, thus: "Employees whose duties are prescribed by these rules must be furnished a copy, which they shall keep at hand while on duty. They must be conversant with the rules and special instructions, and render every assistance in their power in carrying them out. If in doubt as to their meaning, apply to proper person for an explanation."

It is wrong to frame a rule so that something must be read into it. Take, for example, Rules G and H. An employee can cause as much trouble by using intoxicants just before going on duty, as while on duty. Rule H prohibits smoking by the janitor in the basement of a passenger station, or a laborer who may be repairing the roof. The rule could be changed to read, "The use of tobacco in the presence of passengers is prohibited."

As the book of rules is for the exclusive use of employees, to begin every rule in the back part of the book with "Employees are required," "Conductors must," "They will," etc., is unnecessary.

The new definitions show improvement, although some one has suggested that unless a halt is called we shall soon have definitions for car wheels and drawbars. At least two more would be acceptable, "precedence" and "trainman." "Precedence" means "authority by time-table or train-order to hold the main track over, or to move ahead of or against another train." My understanding of a "trainman" is "a person assigned to a train to take part in the work of its proper movement." Under this definition it will not be contended that mail clerks are included, but it does seem to be sufficiently broad to embrace the train and engine crews, and also baggagemen, who are sometimes required to flag. By Referring to Rule 104, as well as many others to be found in different books, it will be seen that it is necessary to know what classes are included when trainmen are mentioned. Inquiry will develop the fact that there is a wide difference of opinion as to the meaning of the word, and some will disagree with my interpretation of it, preferring to exclude enginemen and firemen.

It is difficult to make a sharp distinction between a "siding" and other side tracks. Perhaps "passing track" would have been better. Ask almost any conductor or engineman who has not been drilled on standard rules what a siding is and he will reply that it is any track except the main track; but if questioned as to a passing track he will at once define it as a track set apart for meeting and passing trains; one on which cars must not be left without permission from the train despatcher.

In nearly all books the watch certificate is printed. It is no more necessary to print this form than a dozen others fully as important.

Rule 4 may turn out to be satisfactory when some points are cleared up by the train rule committee. One question that is now being asked quite often is whether or not No. 1 can start by new time-table at 9 p.m., 30 minutes late, if due to leave its initial station at 9:30 p.m., by old table, and at 8:30 p.m. by new, and the new time-table is made to take effect at 9 p.m. I would not care to express an opinion either way, as to do so might cause some one to get an impression differing from that intended by the men who have authority to settle the dispute. I do not favor adopting the rule with the words "class, direction, and initial and terminal stations" retained. Such a condition occurs but once in a lifetime, and there is some risk in requiring men to check every schedule for these things every time a new table takes effect. Should there be a difference and the train therefore be not authorized to run, some one might overlook it in checking. It would be best to omit such words and provide for the differences spoken of in a different way—by annulling the schedule. If the words "and date" had been added after "number" in the last line of the first paragraph, the rule would have been plainer.

In order to economize space, slight changes in rules will not be noted here, but all that are printed in the summary may be understood to differ in some way from the code, in just what particular can easily be ascertained by comparison. For example, see Rules 7 and 26.

Two or three additional whistle signals are often provided in Rule 14: (*o*) Two short blasts, given three times, with proper intervals between, is a good signal to indicate that the brakes are sticking. (*n*) One short, one long and one short, can be used by passenger enginemen to acknowledge conductor's air signal indicating that the train holds an order to meet, or wait until a certain time for, another train at the next station, or the signal may also be given when a superior train is to be met by time-table. It is not safe to acknowledge such signal by two short blasts of the whistle, as this has often misled a flagman in front of the train and caused him to cease flagging, step aside, and allow the train to collide with his own.

At least two air signals can be added to Rule 16 to advantage: (*i*) six, to shut off steam heat; and (*j*) two short, followed by one long, to remind engineman of a train order, or a superior train to be waited for. It may be contended that two short, followed by one long air whistle, cannot be made and have enough air left to immediately signal to stop should it be found necessary to do so, but no trouble will be experienced if the proper reducing valve and whistle are maintained on the engine and kept in good order.

Although Rule 17, requiring the head-light to be concealed when a train has cleared the main track to meet another, etc., has been in effect for years astonishingly little attention has been paid to the matter. Means for covering the head-light are of the crudest kind. Generally the fireman must risk his life by going to the front of the engine, where he must climb up several steps and attach a shield, or open the front of the head-light to get at the curtain to pull it down. Electric head-lights are sometimes turned down, thus rendering the engine-number in the head-light so dim that the train cannot then be identified by its engine number. A few companies have provided an incandescent lamp to be switched on while standing on the main track to meet trains. It is quite difficult to see the track and signals in the face of a powerful arc light and a flagman back of it cannot be seen at all. It is possible to reduce the brilliancy of the arc light, but there is some risk in permitting the practice, as enginemen are apt to turn the light down too low and give a false indication to an opposing train. The old 23-in., deep-reflector oil head-light was in many ways superior to the present smaller oil head-lights, and there is a growing disposition to return to it. There is another way in which this rule is imperfect: the engineman gets no distinctive signal from the rear when his train is clear of the main track. Either he guesses at it, or has to wait until told by the man who has walked from the rear for the purpose. Often this causes delay to opposing trains, as they may arrive before the man has been able to make the long foot journey. It may be said that a stop-signal given from the rear is sufficient. This is no doubt quite common practice, but should the caboose leave the rails at the switch such a signal would be given at once and the engineman might then cover his head-light and cause a collision. When it is impracticable to go to the engineman, or when he cannot positively know that his train is clear on account of the siding being in a curve or the tracks close together, he should receive a stop-signal from the rear given by a green lamp. Where such a signal cannot be seen a man should be sent to tell the engineman that his train is clear of the main track. Under the rule the head-light means much to the approaching train, and it is therefore worth while to go into this question thoroughly, and make it practicable to comply with the rule.

Rule 19 provides that markers shall be turned to show green to the rear when a train turns out to meet another, the same as when it takes the siding to be passed. The argument in favor of the practice is that then men will form a good habit and not forget to turn markers when they are to be passed; that a train may desire to pass while they are waiting to meet a train; that it is good information for the following train; and that it furnishes the towerman necessary advice. If the man who made the rule will follow a freight brakeman around all night he will probably modify his views and change the rule back to read as it originally did.

The practice of allowing markers to show red to protect some other train is objectionable. When a train, to allow a following train to pass, finds it necessary to head in on another train, and the siding will not hold both trains, and the train met on the siding has to back part way out on the main track, each should look out for itself. Whenever the correct and sound theory that every train must be protected by its own men is departed from, collisions are advertised for. The markers should be changed to show green at the rear when clear of the main track, and the train which must back out should be fully protected by its own men. The principle in this case is the same as that relating to concealing the head-light—it is concealed when the train is clear of the main track, regardless of any following train.

Rules 24 and 102 relate to practically the same thing and would be better consolidated.

It would be interesting to know in how many states the law requires each car of a passenger train to be connected with the engine by a communicating signal appliance, and how the law is complied with on freights that carry passengers. Mixed trains often haul 15 or more loads and to attempt to work a bell-cord over this many cars is impracticable, but Rule 25 requires that it be done.

Rule 29 is badly administered on many roads. During a recent trip the different ways in which different roads were seen to be complying with the rule were remarkable. On one large system the engineman rarely whistled, except for stations and public cross-

ings, while on another road, where there were fewer trains, the whistle was used every few minutes. To get the block signal changed to proceed, four short blasts were blown, and its change was acknowledged by two short. With these unnecessary signals added to the station whistle, to the answers to conductor's signal to stop to let off passengers, the signal calling attention to flags displayed for a following section, and answering such signals given by other engines, there was a confusion that made the entire matter of whistling seem ridiculous. Sounding two short blasts at any and all times impairs its efficiency and often causes flagmen to be misled. In order to provoke argument, I shall propose a rule based on a radically opposite view, to illustrate how far some companies have strayed in the wrong direction.

In Rule 82 a decided improvement has been made. The old rule was generally misunderstood and was far from clear. Under the new rule there should be no misunderstanding, although it is somewhat more exacting than appears to be necessary. It will be noticed that a sharp distinction is made between the schedule and a train which may be using such schedule. The schedule is in existence until 12 hours after its leaving time at each station, while in the case of the train it becomes void when it is 12 hours behind either its arriving or leaving time; but if there be an unexpired part of the schedule the despatcher may authorize it to resume its run under the schedule, if he desires to do so, or he may give the schedule to some other crew. This is correct theory, because other trains must clear the schedule, not the train. The only objection I see to the rule is in stating that the train loses right and schedule when 12 hours behind either its arriving or leaving time; if it has three hours dead time at a station, and arrives less than 12 hours late, it should be allowed to leave on the schedule, if it can do so while the schedule is in existence.

When the second paragraph of Rule 85 is considered, it would appear that the word "may," instead of "will," should have been used in the third line of the first paragraph. Taking the rule as a distinct proposition it hardly covers the ground. A train may run ahead of another of the same class only to the schedule passing point, where it must take the siding and wait indefinitely for the train which is scheduled to pass it, unless advanced by train order. One is apt to get a different impression in reading this rule, and unless this point is cleared up it may be necessary to make a ruling to the effect that the train to be passed becomes inferior from the schedule passing point. The schedule passing point shown by time-table is a form of special instructions and supersedes the book of rules.

Code rule 86 appears to have been made by some one possessing a laudable bump of caution, but when applied where stations are far apart, making the running time of first class trains say 30 minutes between stations, it will impose unnecessary and unbearable delay upon freight trains. A simple 10 minutes clearance between passenger trains and inferior trains moving ahead of or following them would have been much more generally acceptable. This rule will do harm because managers hesitate about deviating from the recommended practice lest there may be a rear collision and in court they be asked to explain why they did not adhere to the standard code. The excessive caution exercised in this rule had better have been applied to the far greater risk of first class trains following each other only five minutes apart; or a lone engine or light freight, the most dangerous trains that are run, following a heavy passenger train closely. Rule 91 does not afford an adequate safeguard.

It would be better not to include instructions to protect, in case a train fails to clear the main track by the time required by rule, with other matter, as is done in code Rule 87. The subject is important enough to warrant its being given a separate rule number, as was done in the old code, and the words "or order" should be added after "rule."

Instructions as to how the inferior train shall take the siding are duplicated in Rules 88 and 89. There is no reason why the matter cannot be disposed of once for all in one rule. When it is remembered that the superior train may sometimes go to the switch farthest from the station to wait for the inferior train, and that time in the time-table or an order applies at such switch, the third paragraph of Rule 88 does not seem perfectly safe. Suppose that there is a crossover in the passing track; would not the inferior train be complying with the rule if it were to pass the initial switch and go to the crossover to pull into the siding? If there should be a collision where there is fog, or an obscured view from other causes, what would be the standing of the road in court? This is one of the most serious oversights in the rules, and one that should be speedily remedied. The rule should require the inferior train to pull into the siding at the initial switch, or send out a flagman from that point.

Rule 88 will not be safe until it requires the inferior train to clear the opposing superior train of the same class a certain number of minutes, or in some other manner provides for a possible variation of watches. While watches have improved greatly even within the past 10 years, there will be in service for a number of years yet watches that cannot be depended upon to show absolutely correct time. Again, time is sometimes misread by looking at hands that are high above the dial from different angles. It looks bad to say in Rule 2 that watches may vary 30 seconds a week, and then prescribe in another rule a practice that might cause a collision, where the view is obscured, if two watches should be a minute apart. It will be said that to require a two minute clearance would necessitate giving too many helping orders to inferior trains to get them to schedule meeting points when on time; but, in practice, it will be found that where time is fast the despatcher fixes meeting points by order any way, knowing that the train is likely to call for help, or through fear that it may be delayed a minute or two by baggage, or animals on the track.

The first and second paragraphs of Rule 90 probably were framed with the view of safeguarding Rule 88, but they are not far-reaching enough to do so in every instance. Let us suppose that Numbers 1, 2 and 4 are first class trains, and that No. 1 is the train of superior direction. It is due to start from A at 2 p.m., scheduled to meet No. 4 at E; and No. 2 is due to arrive at A at 1 p.m., but is three hours late. Notwithstanding No. 2 has the same authority to move against No. 1 that No. 4 has, No. 1 may pass all stations just as fast as its engine can turn her wheels, totally disregarding No. 2, until station E is reached. Here No. 1 must stop, if No. 4 is not there and the view is obstructed; and must thereafter run prepared to stop at all sidings, until No. 4 is met. What is the difference between the two trains? If it is necessary to thus protect No. 4 so that it may come to a station up to the minute No. 1 is due to leave there, is it not equally vital that No. 2's movement against No. 1 be provided for in the same way? To be consistent, rule 90 must read "Until all overdue trains of the same class have been met, the superior train must approach all stations under control, except where there is an unobstructed view from both directions and the track is seen to be clear." Even this provision is open to criticism, because when restriction is placed upon No. 1 in this manner the moral effect is to encourage the men on No. 4 to take just a little chance that they otherwise probably would not. They feel that No. 1 will be on the lookout for them on the main track at the station about the time No. 1 is due to leave there. The word "superiority" should not be thus limited. It should always convey with it assurance that a train is superior in the most unqualified sense of the word. It will be noticed that should No. 1 be ordered to run an hour late, No. 4 could then advance beyond the schedule meeting point on a copy of the order and No. 1 would not be looking out for it. Also, No. 1 may be five or ten minutes late, but without orders to run late, in which case, of course, all opposing inferior trains would have to clear No. 1's time-table time; yet No. 1 is not relieved from the duty of approaching the schedule meeting point, and, other stations beyond, prepared to stop, thus hampering its movement unnecessarily. If Rule 88 provided for keeping the inferior train entirely out of the way of the superior train of the same class a given number of minutes, the restriction now placed upon the superior train by Rule 90 could be done away with.

Rule 92 says that a train must not arrive at a station in advance of its schedule arriving time. It should go on and say "except to properly clear at schedule meeting and passing points." If No. 15, a second class train, is scheduled to let No. 1, a first class train, pass at E, and has an arriving and leaving time there, how is it going to get there when on time and be in to clear by the time No. 1 is due to leave the next station in the rear where time is shown, if No. 15 is forbidden to come to E enough ahead of its arriving time to enable this to be done? It may be said that of course it may do so under Rule 86. If that be true Rule 92 should be qualified to harmonize with Rule 86 and put at rest an argument that will come up daily. It is not good practice to arbitrarily restrict a train in one rule and attempt to nullify the restriction by another.

(To be continued.)

Foreign Railroad Notes.

A Hungarian journal says that the highest speed ever reached in Hungary was made during some trials recently with a "four-cylinder Atlantic locomotive of the latest style," which sounds quite American. The speed attained was 87½ miles an hour.

The State railroads of Wurtemberg are in charge of the Minister of Foreign Affairs. Baron von Soden, who has been the minister for some years, has retired, and is succeeded by Dr. von Weizsackes, who has been trained for the work during the past six years by serving as Minister of Schools and Churches. If Americans question the suitability of such training for a railroad manager, they will do well to remember that our Secretaries of War and the Navy are usually lawyers, and our Postmasters General often only wirepullers. Dr. Weizsackes is 53, the son of one of the most distinguished of German theologians; he has been in the State service since leaving the university, where he studied law, as do most of those who aim at high administrative service in Germany.

Diamond Jubilee of the Great Northern Railway.

BY W. B. PALEY.

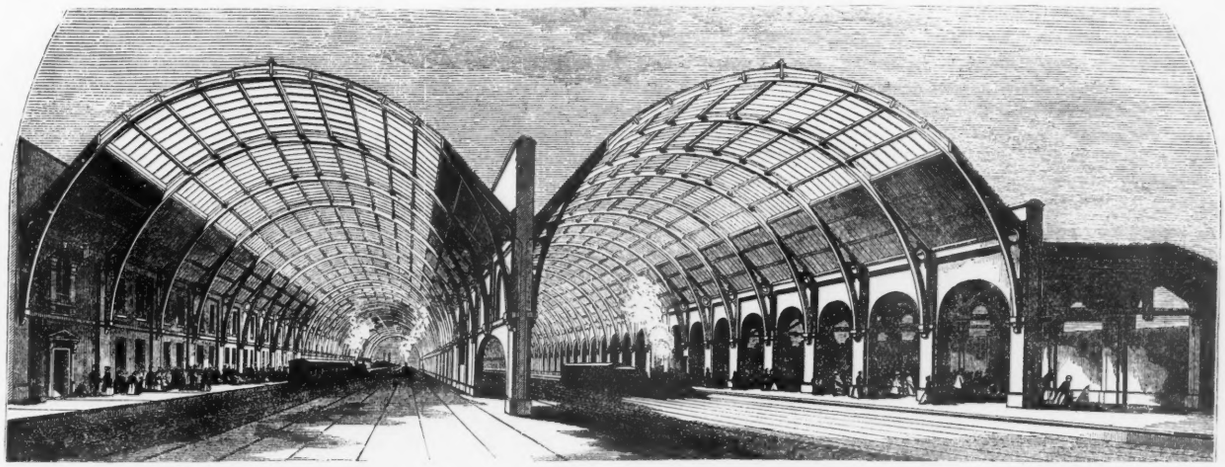
On the 26th of June one of the best known British railroads, the Great Northern, reached the 60th anniversary of the passing of its Act of Parliament. It is a somewhat remarkable fact, considering the extraordinary dimensions the great railroad mania of 1844-5 attained, that this is the only London trunk line, designed as such, which dates from that period. In its time it filled the only important gap left in the communications between London and the provinces, and for many a year was regarded as the last great line that would be built out of London.

The project was not entirely new, however, at the time when it was most prominently before the investing public. So early as 1835 there had existed, on paper, a Great Northern Railway, but it failed to get an Act, and passed out of sight the following year. The negotiations which led up to the formation of the present company date from the spring of 1844. The prize was so valuable that at one time four competitors were struggling for it. At last there remained only two, the London & York and the Direct Northern, which finally agreed to unite their forces under the title of Great Northern, and as such obtained their Act on June 26, 1846. It was not got without desperate fighting in Parliament and the utter waste of sums which would have made many miles of line. The two most powerful opponents of the scheme were George Hudson, the railroad king, the interests of whose lines were affected; and Robert Stephenson, who held that the estimates were much too low, in which opinion he proved quite correct.

The principal objects of the line were (a) to provide access for the agricultural produce of the great farming county of Lincoln to the London markets; (b) to enable South Yorkshire coal to reach the eastern counties and London, as regards the latter by a more direct route than the Midland, and (c) to join in a direct east coast line to Newcastle and Edinburgh by way of York. To effect the first object a loop was made from Peterborough round by Boston and Lincoln to the main line again near Doncaster, thus giving the system roughly the shape of the letter P. However, the Great Northern never got to York by a line of its own, and probably never will. Practically it ends at Doncaster, only 156 miles from London, though by joint ownerships and running powers further on it connects with Leeds and Bradford and with several local lines thereabouts wholly its own property. The North-Eastern and Lancashire & Yorkshire pour a vast traffic on it at Doncaster; in fact, the line has always been noted for being "fed from its extremities." It has also important connections in the Nottingham, Derby and Burton districts, but these only date about 30 years back and formed no part of the original scheme.

The King's Cross terminus was formed, in a poor and squalid neighborhood, chiefly upon the site and grounds of the smallpox hospital. Though considered abundantly spacious at the time, the position is now too confined and the G. N. R. is probably worse off, as to the possibility of future expansion in London, than any other line. The hospital was obtained for £60,000, a sum which would be ludicrously cheap nowadays for the space it covered. King's Cross, however, was by far the finest London station of its time, and is beaten by few even now. Its two great semi-circular spans, 800 ft. long, 105 ft. wide and 70 ft. high, produce a fine effect. The platforms have been extended beyond them at the north end and are about 950 ft. long. There is only one chief main line departure platform, the principle being to load two or even three trains, one behind the other, at it. The screen at the south end, with its two arches corresponding with the spans of roof, is more useful than ornamental, the openings helping greatly to light the station. It is a characteristic bit of Lewis Cubitt's work, Italian campaniles being quite his specialty. The roof girders were originally each formed of sixteen 1½-in. planks, screwed together at frequent intervals and always breaking joint. The girders were 20 ft. apart, 11 in. wide at the bottom and 9 in. at the top, the idea being taken from the Czar of Russia's riding house at Moscow. Both spans have long been replaced in iron. Besides the obvious drawbacks of wood, it was found that the eastern or up side wall of the station was in danger of being pushed down by the effort of the planks to straighten themselves. This side originally had no support other than a covered cab-exit road reaching up about 30 ft., but a long range of offices has since been built over the cab road and the up side is now as secure as the down, along which are the administrative offices, booking hall, etc.

A little way outside King's Cross the line goes under the Regent's Canal, with a very narrow margin of headway, and then under the goods yard, which abuts upon the canal. From here, on August 8, 1850, the first G. N. train left London, King's Cross station not being opened for traffic till Oct. 14, 1852. Tunnel after tunel succeeds, there being seven in the first 12 miles. They are in the London clay, which necessitated the cuttings being widely splayed, making the construction difficult and costly. Much of the clay was burnt for ballast by being mixed with coal in large heaps, which smouldered away for many days. The line rises 1 in 108 at the start for a couple of miles, and 1 in 200 for eight more, after a rest of three miles. Keeping pretty steadily to this summit level of 350 or 360 ft. for some 16 miles it gets down to very low ground, to rise to about the same height 100 miles from London by nine miles of 1 in 200 and 1 in 178. With these exceptions the main line is decidedly easy, and as it is very free from sharp curves, high speed has always been a special feature of Great Northern practice. For many years it was much the fastest of the standard gage lines. Even in 1852 it ran the 44¼ miles from Hitchin to Peterborough in 58 minutes.



King's Cross Terminus, Great Northern Railway.
—From the *Builder*, October, 1852.

Probably no line in Great Britain works so hard for its living, all its heavy traffic being keenly competitive. A large suburban traffic has sprung up of late years, but is being cut into by electric tubes and tramways. Lincolnshire is largely its monopoly, but a railroad cannot live upon potato traffic. Immense quantities of bricks are brought to London from various places between Hitchin and Peterborough. The line is recovering steadily, however, after being badly hurt by the defection of its old ally, the Great Central, in 1899. It has had many financial ups and downs, having paid a dividend of only 2⅜ per cent. so recently as 1895, while many times it has paid over 7 per cent. For the 55 years, 1851 to 1905, however, it has paid on an average practically 4¾ per cent., which is quite as much as most British railroads can say for themselves. The unusually large proportion of about one-third of the system consists of joint lines, a policy which seems to have been carried a little too far in the past, as it often amounts to letting in a rival and paying half the cost of his coming. At the close of last year the Great Northern owned 705 miles solely and 245 more jointly, making 953, upon which the company ran 13 million passenger train miles, and 10 millions goods and mineral. A stock of 1,279 engines performed this duty. Various types of these have been frequently described in our columns. The Great Northern has always been one of the very smartest of English railroads, and maintains its reputation to-day as fully as it has ever done.

Modern Scientific Lubrication.

In a paper read before the New England Railroad Club in April Mr. H. C. McCarty considered that much might be said for and against the use of grease. Ordinarily, oil is superior in its lubricating qualities, though under average mechanical conditions grease will endure more prolonged hardship in service, which is the special advantage found in its use.

In fitting driving boxes and rod brasses it has been found good shop practice to have both edges of driving-box brasses and rod brasses rounded with the usual radius in common practice, at one edge of brass. This practice may at first be questioned, but the conditions of service warrant carrying out the details. Both in the case of driving boxes and rod brasses there is a violent lateral movement under speed, and the simple philosophy is that a well-rounded edge will move over the surface of the journal with less friction than will an absolutely sharp edge. Engines at moderately high speed spasmodically throw excessive loads on opposite ends of driving boxes by the violent rolling action, and at the same instant there is a rapid lateral movement. It will, therefore, be appreciated that there is a most striking contrast in the effects produced by the rounded or perfectly square edge under these conditions. This sharp edge should not be removed by the use of a file, but by suitable tools on the machine with at least a ⅜-in. radius. This requires more machine work, and for this reason often is not done. It is an important detail, although at first it may appear trifling.

The proper adjustment and maintenance of ordinary wedges are problems that are intimately related to the satisfactory lubrication of the engine. This is brought out especially by the blows that are delivered at each stroke of the piston in addition to the violent vertical action of the driving box, which is directly on the face of the wedge. With the present form of wedge and bolt it is practically impossible to maintain a reasonable degree of adjustment of driving boxes on heavy power. Attention is therefore called to the design shown in the accompanying illustration, in which there is the ordinary form of shoe on the left that fits the binder at the bottom and the top of the pedestal in the usual way. On the wedge side of the box there is a corresponding shoe fitting the binder at the bottom and the pedestal snugly at the top. Back of this shoe, within the flanges, is an ordinary square form of wedge. In this instance the wedge bolt is not attached to the wedge. With this construction under normal conditions the driving box is working on the face of the shoe on the wedge side of the pedestal, and not on the wedge, as in the case of present construction. There is therefore no action vertically on the wedge, and it cannot be disturbed, so that there is no such thing in this construction as a wedge creeping up and sticking. The shoe cannot creep, as it fits the binder beneath and the top of the pedestal above. Since the wedge is protected between the flanges of this shoe and back of its surface, there is no vertical action brought upon it by the box.

Fig 1.

Fig. 2.

Fig. 3.

Fig. 4.

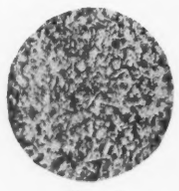


Fig. 5.

Fig. 6.

Another point of importance in lubrication is the proper fitting of brasses in journal boxes. The upper left-hand figure of illustration represents a M. C. B. form of journal bearing of proper size, and shows its correct relation to journal and wedge. The view to the right represents a brass of slightly improper design in detail, frequently found in service. It will be observed that owing to a large fillet in the angle of rib at back end of the brass, the wedge cannot be placed in its proper position, as clearly shown on the plate. This is an apparently trivial oversight in making the pattern, but it develops very serious results in service, as the brass in consequence is forced solidly against the back end of the journal, and the front end of the wedge is forced back of the lugs in top of the box. This is a common condition in daily service.

The end view to the extreme right represents a bad form of wedge or brass. In such cases the wedge or brass is unfit for service and should not be used. This is more serious in service than the former condition. General foremen and foremen of inspection can readily detect this by ordinary observation of brass or wedge. M. C. B. standard gauges for brasses and wedges are useful in detecting these imperfections.

The sectional view at the lower right-hand corner shows the radius of the wedge at the back end of practically the proper dimensions, while the radius at the rib at the back end of the brass is much too large, preventing the wedge from approaching the rib as it should. The enlarged view is made to more forcibly bring out the condition shown. The result is that when such crowding as this occurs the side lug of the brass is in contact with the side lugs on the inside of the box, as shown on the plan, all of which produces serious difficulties.

Another condition, shown at the extreme right upper corner, is an improper angle of the wedge engaging on the sides of the brass, near the bottom line of the brass, thus producing a pinching effect on the brass as it is related to the journal. This is an extremely bad case, yet quite frequently found in service. It usually comes from a lack of care in conforming to the new pattern standards. It gets in service through lack of proper inspection. In short, any cramping must be avoided, for it has been proven conclusively in practice that the brass and wedge and box as assembled must have absolute freedom. The successful running of journals largely depends on the freedom given the brass, wedge and box, and it might be commonly compared to the great ease of an old shoe on the foot as compared with a new one. These details are mentioned to show the importance of checking up from time to time new brasses and new wedges. Finally it should be borne in mind that the side angle of the wedge must not engage with the side angle of the brass, thus giving a top or crown bearing between the wedge and brass. Perfect freedom at these points is absolutely essential if good results are desired.

One of the best means in existence for instructing men in the proper care and packing of journal boxes is to have a box made of galvanized iron, and fitted with glass on each side to expose to view the packing the whole length of the box, the object being to use this box when examination of men and their practices in the care of packing in boxes is being made. If a box designed on this principle is placed in an instruction car, it will serve a good purpose in improving the practices of men engaged in oiling and packing. Metal shields are placed over the glass while the men are demonstrating their work, and then removed by the instructor to show the effect of the practices followed.

The metal in journal bearings is, of course, closely associated with lubrication. The chemical analysis of bearing metal in many instances is the only feature considered, but in addition to this there should be a microscopic study made of journal bearings as part of the system of tests made from time to time, to indicate the manner in which the metals are united. For although we may be using the best known formula, with the highest grade metals, yet good results may be defeated simply by indifferent or careless foundry practice. This can only be discovered through a microscopic study of the product from time to time, and it therefore is unsafe to test out brasses by chemical analysis only. Microscopic study has within a few years developed a marked improvement in foundry practice, and has brought up the standard of manufacturers of brasses to a much higher degree.

Fig. 7.

The accompanying illustrations are reproductions of microscopic photographs by which the structure of the several bearing metals is clearly shown:

Fig. 1 represents antimonial lead with from 1 to 25 per cent. of antimony. In this the metal is very uniformly amalgamated. This is, of course, a matter of the greatest importance.

Fig. 2 shows a similar metal composed of 16 per cent. antimony and 84 per cent. lead, which is in very general use.

Fig. 3 is composed of 20 per cent. antimony and 80 per cent. lead. In this the metal was not properly stirred while being mixed, and therefore shows decided crystals of antimony, producing hard spots in the metal and frequently resulting in hot journals.

Fig. 4 consists of 40 per cent. antimony and 60 per cent. lead. Here also the metals are separated and the antimony crystals prominently appear.

Fig. 5 is a genuine Babbitt metal composed of 80 per cent. tin, 10 per cent. antimony and 10 per cent. copper. The mixture is uniform and the metal of good quality.

Fig. 6 is a white metal containing 86 per cent. tin, 12 per cent. antimony and 2 per cent. copper. It will be observed by the large cubes in the figure that there is a distinct separation of metals. These cubes are almost entirely antimony and tin. This may appear an exaggerated condition, but it is shown to indicate what is likely to happen under careless foundry practice. A microscopic examination of brasses in special cases of hot journals would be found to develop many interesting conditions and result in a more intelligent course in applying remedies for such difficulties.

Fig. 7 represents a bearing metal in very general use containing 76.88 per cent. copper, 10.62 per cent. tin, and 11.71 per cent. lead.

Fig. 8 is a composition of 70 per cent. tin, 25 per cent. antimony and 5 per cent. copper; white metal. In the view to the left the crystals shown are small and uniform. In this case the metal cooled quickly. In the view to the right, with large developed crystals, the metal cooled slowly. This clearly shows the effect of foundry practice in the cooling of metals.

Fig. 9 represents a 5 in. x 9 in. Babbitt metal brass that ran cool for 4,000 miles and then suddenly became hot. Ordinarily it would

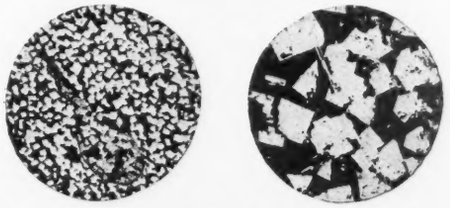


Fig. 8.

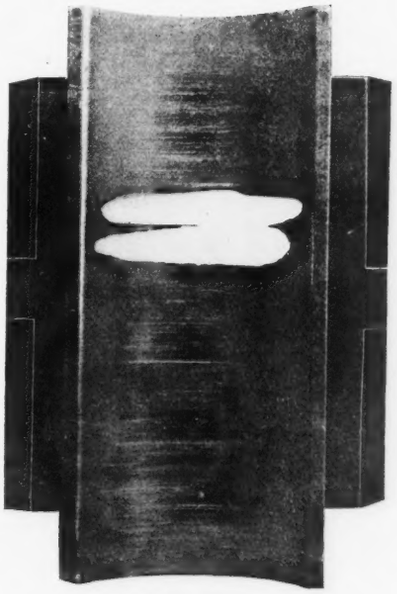


Fig. 9.

be supposed that the heating was due to hard spots in the bearing, but an examination did not prove this so. It was shown that the steel journal had a small hard spot corresponding to the patches shown on the brass. This could not be detected by the eye, but was discovered by carefully passing the finger over the surface. The hard spot problem, therefore, is not always a responsibility of the brass. It should be said that, in this case, the journal and bearing was flooded with oil, which clearly proves that a slight imperfection of journal or brass will abruptly cause a hot journal, although the most intelligent attention may have been previously given to it in oiling and packing.

Various mixtures are and have been used with satisfactory results for journal bearings and for lining journal bearings:

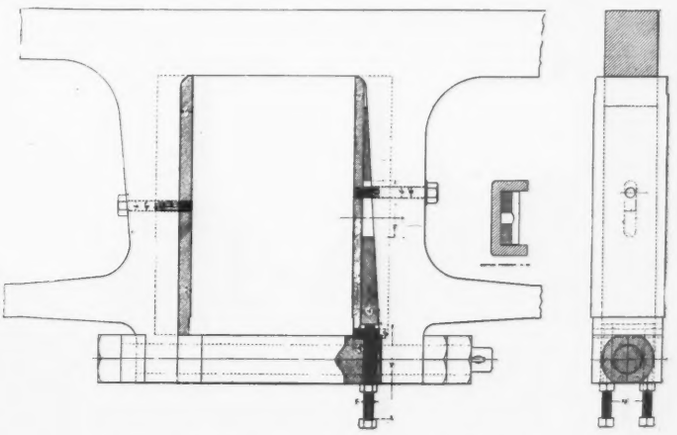
For lining bearings 13 per cent. antimony and 83 per cent. lead is satisfactory.

A mixture to which a somewhat heavier load can be applied is 5 per cent. antimony, 5 per cent. tin and 90 per cent. lead.

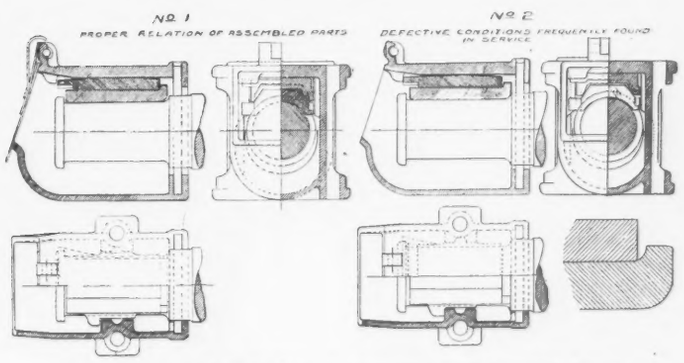
The mixture commonly in use for journal bearings proper is 10 per cent. antimony, 10 per cent. tin and 80 per cent. copper.

A mixture substantially as follows in extended use has produced very attractive results for journal bearings proper: 5 per cent. tin, 30 per cent. lead and 65 per cent. copper.

It should be remembered that the best known formula or mixture, either for lining bearings or for the manufacture of bearings, can be seriously impaired by careless foundry practice.



Suggested Arrangement of Pedestal Wedge.



Proper and Defective Arrangement of Journal Boxes.

Leaves from a Railroad Engineer's Note Book.

III.

[Mr. W. W. Hoy, of Johannesburg, South Africa, Chief Traffic Manager of the Central South African Railways, spent about half of the year 1905 inspecting American and European railroads. The appendix to his formal report to his company, consisting of "brief notes on various railway practices," has the freshness and charm which belongs to honest jottings of first impressions, although a trifle more care would have prevented his occasional errors.]

CANADIAN RAILWAYS.

Canadian Pacific Railway.

I left Montreal at 9.40 a. m. on Sunday and arrived at Vancouver at 12.30 p. m. the following Friday. The distance is 2,942 miles and the speed averaged 21⁴/₅ miles per hour.

The passenger rolling stock in general use is the open sleeping-car type, built to accommodate 16 passengers, with one stateroom, which has accommodations for two passengers. Palace cars are now being run, but an extra charge of 36s. per passenger per night, in addition to first-class fare and sleeping fee, is made for what in America is regarded as luxurious traveling.

Tourist or colonist cars have partial sleeping accommodation, bedding being supplied at one-half Pullman rates.

No privately owned Pullman cars are run on this line in general traffic. All cars are owned by the railway.

Gas is the general illuminant on all cars.

Several passenger carriages are fitted with mosquito netting.

Books, periodicals, newspapers, post-cards, illustrated playing cards, postage stamps, telegraph forms, guide-books and time-tables, etc., are obtainable on all trains at various centers—one bulletin to each car.

Compressed air is used in the saloons to force the water from tanks to wash basins, no pumping being necessary.

Each car is supplied with hair and clothes brushes.

Iced spring water is supplied for all filters, which are attended to at appointed stations.

Passenger vans have grooved floors with holes bored through to allow the escape of water from melting ice and so avoid damage to traffic.

The dining-car waiters are all European, and during summer wear white duck jackets and white aprons. Each waiter wears on his breast a metal plate number.

The dining car inspector has a special uniform.

The chairs in buffet and smoking compartments have rubber

pads screwed on the base of the legs to lessen vibration and prevent sliding.

The train staff consists of one conductor for each division, one colored assistant (who is called a porter) for each car, one or two baggagemen as required, two brakemen, one dining-car inspector, four dining-car stewards.

The staff on the train by which I traveled numbered 1 conductor, 13 attendants and 9 others, in all 23.

The native porters travel with the car from ocean to ocean, a distance of nearly 3,000 miles.

Trains leave stations, without warning, as soon as the booked time of departure arrives.

The "despatcher" arranges the passing of trains at night time over sections up to 50 miles in length. It is customary to close certain stations during the night.

Trucks conveying fruit are heated or chilled according to the season of the year. When heat is necessary the temperature is maintained by two oil lamps in each truck. An additional charge of 10 per cent. above the usual freight charge is made for this service.

Perishable cars are iced at appointed stations en route, for which service special charges are made.

The manifest freight car system is in use, the head office being at Montreal.

In case of error in or delay to the movement of rolling stock it is customary to debit the agent responsible with the charges incurred, leaving him at liberty to recover the amount due from the staff to blame.

A special account, known as "wrecking account," is kept, to which all damages of whatever description to trucks, engines and other rolling stock (including passenger vehicles) are debited. The results of working are taken out before this amount is placed against the working expenses.

Very few of the intermediate stations on the main line are equipped with fixed signals, but each siding—intermediate or otherwise—has two boards placed a certain distance from the facing points. The board with name of station (black lettering on white board) is placed one mile in advance of each set of facing points for the guidance of the running staff.

At certain stations signals are provided to admit of trains running through without stopping for orders.

Disc indicators are in general use at facing points, but intermediate sidings have warning boards only.

At certain stations, where, in the interests of the expeditious working, it is necessary to shunt outside the points, a warning board with "Yard Limit" painted thereon is placed about a mile from the last pair of points, and shunting is allowed within such area without resorting to the usual practice of protecting the trains. All drivers approaching such stations have to keep their train under control as soon as the board is visible, in order to stop immediately if necessary. The drivers on the American railways did not lower their speed below 20 miles per hour on any occasion of passing such signal.

Switches at stations are attended to by brakemen. The station master attends only to station duties.

Stubb switches are still in use, but are being gradually withdrawn, as they are not suitable for main line working.

MacPherson's patent safety switches and points are used at junctions of sidings with main line. These switches are also used in connection with loop intermediate sidings where train crossings are not very numerous.

Compound engines are employed with very good results, their use effecting a saving of from 15 to 20 per cent. as compared with simple engines.

"Thermit" is utilized with good results, but is still more or less under experiment.

A special "weakening groove" is adopted on all engine cylinders.

Simple engines are now being fitted with superheaters.

To facilitate locomotive working, and to avoid detention to engines awaiting light repairs, the locomotive parts of engines under heavy repairs are very often exchanged.

Picked coal is used on passenger train engines, and a very close check is exercised on all coal issues and the coal consumption of engines.

The locomotive shop plant has been arranged on a very progressive system.

All machinery driven electrically is of the individual type installation.

Oil furnaces are in general use, the fuel costing from 3½ to 4 cents per gallon.

Wherever possible, piecework has been introduced.

The hours of employees in the locomotive shops are from 7.00 a. m. to 5.30 p. m., 30 minutes being allowed for lunch.

Smoking is not allowed during working hours.

The railway is mostly single track, with crossing stations where necessary.

Long loop stations, having short wooden platforms erected about the center of the loop, are provided for train crossing purposes.

Eighteen wooden sleepers are used to each 32-ft. rail. Old sleepers are always burned to prevent theft or to obviate pretext for theft.

On certain sections which have not been relaid the weight of rail is 56 lbs; 126-ton engines, drawing mail trains, are run over these sections without causing any particular damage.

The broken joint system of laying rails is in general use. There is much less noise in running, and the train travels very smoothly.

On all curves the rails are supported by a special chair placed on every fourth sleeper. Additional fishplates are used to each rail on curves.

At distances of about one mile there are placed sleepers which are cut to hold three rails to prevent their burial by snow, etc., and the nearest telegraph pole is marked by means of a white ring placed round it, about 6 ft. from the ground, to indicate position of rail rack.

A limited supply of ballast trucks is owned by the maintenance department, and when additional ones are required the same are obtained from the traffic department and paid for at the rate of 30 cents per day.

Ballast engines, enginemen and guards are hired from the operating department. The men are paid directly by the engineering branch while working for that branch. Complaints against the men are dealt with by the operating department and investigated conjointly with the department borrowing the men's services. In complaints of a serious nature the men are returned to the operating department and a new staff requisitioned for.

The railway is fenced almost throughout its entire length. As soon as a farmer brings his fence up to the railway boundary the railway is required by law to fence its line at that section.

The length of a District Engineer's section is about 500 miles.

Wooden loading platforms are provided at prairie stations to enable farmers to load their grain.

Grain elevators are provided by grain merchants at certain stations, to which farmers can bring their grain for sale and despatch to the coast. The farmers, of course, have the alternative of direct loading of their produce to the coast, where a better price is generally obtained. I understand certain of the levators are owned by the railway administration.

The cartage at Winnipeg is performed by a cartage contractor, who also collects all charges from the public and pays to the railway department daily the accounts thus collected.

The live stock liability limit has been fixed at $50.

The scale department, which is attached to a branch of the department, under the Superintendent of Motive Power, examines, tests and repairs all weighing machines and scales. Any broken or damaged parts are taken out of the machines and replaced by new castings by this department.

The policy of the railway is to promote men who acquire a practical railway experience, and whose qualifications, appearances, etc., fit them best for the higher positions. Promotion to any position is open to all grades in the service.

A special inspector from the head office visits the various stations and reports personally on the general working to the head of the department and to the President.

The administration does not encourage fining, but rather dispenses with the services of staff against whom there are complaints.

Grand Trunk Railway.

This railway keeps a complete record of all its rolling stock on the car manifest system. Some railways record only the express freight.

ENGLISH RAILWAYS.

Great Western.

Rail motors.—The tariff from London (Paddington) to Southall, 9 miles, is 14 cents; from Westbourn to Southall, 8 miles, 12 cents; return fares, 24 cents.

No season tickets are issued.

The vehicles can be driven from either end, and the crew consists of driver, fireman (often a lad) and guard or conductor. The speed works out at 20 miles an hour.

The cars have accommodation for 52 passengers. The seats are of cane. Gas lighting is employed.

The motor carriages run on the usual train signals.

Up to the present the cars are paying, and in some cases are hauling trailers where traffic calls for extra accommodation.

Road auto cars are being generally introduced, and are being developed to act as feeders for main arteries of traffic.

The road cars are worked by petrol, and so far have proved successful. Whether they will stand the wear and tear of roads long enough to earn their capital cost and maintenance is still an open question, for experience has taught that after two or three years the cars do not run easily, and in some instances are forbidden to run by the "Watch Committee" of twenty towns on account of the noise or odor which they occasion.

The development of the petrol machine still necessitates considerable care being exercised before a decision is come to for its adoption. Improvements are regularly being made in the use of petrol.

The Continental mails are conveyed from London to Dover direct, a distance of about 80 miles, by postal road motor car.

Midland Railway.

Somer's Town goods station. A day's work consists of 10½ hours, and that of a night is reckoned at 9 hours.

The goods staff are paid by results. Each gang consists of one checker, one caller and two barrowmen.

All traffic dealt with exceeding in quantity 25 tons per day is paid for at the rate of 14 cents per ton.

To enable the truck-packing staff (who are paid by the day) to participate in the bonus system—which works to the satisfaction of both the men and the railway company—an exchange of gangs is made every two months.

A large amount of traffic is warehoused at Somer's Town for the convenience of consignees. There is also a large store for accommodation of potato traffic situated at this station.

The goods station is on two levels; the upper station has 26 roads with corresponding bay platforms to admit of the sorting of traffic for direct despatch, while the lower is utilized for feeding the upper floor by means of hydraulic lifts.

London Railways.

The most striking feature of a study of the railways in and about London was the extremes in railway practice obtaining, more particularly with regard to the city and suburban traffic.

The working of some of the underground railways is open to considerable improvement, as the station stops vary between 35 seconds and 4 minutes. The City & North London Railway, however, with an average stop of 11-44 seconds, is as up to date as possible. The factor which will militate against the urban services ever approaching those of New York in point of rapidity in the conveyance of passengers from one part of the city to another is the length of time occupied in gaining excess to and egress from the railways.

The Metropolitan and the District Railways are being electrified. One peculiarity of these installations is that the electric trains of the one line cannot run over the rails of the other, owing to some technical detail, as I am informed, in the adjustment of the slipper shoes.

The new electric stock on the District Railway is of the end and middle door type. The end doors are used for the entrance of passengers, while the double doors in the center of the coach are used for the exit of passengers and are labeled accordingly. Air pressure is utilized to operate these doors.

The fares vary on the different railways. The Central London Railway (commonly known as the "Tuppenny Tube") has adopted the American system of one uniform fare and class; the Metropolitan and District Railways still preserve the two classes and the sliding scale of fares; the City & North London Railway has also adopted the latter, but there is only one class for travelers.

The London & South-Western Railway has an electric railway—underground—from Waterloo to the Bank. Tickets are sold on the train in the same way as on trams.

At the underground stations, which connect with the main line stations, an electric push-bell is placed in a conspicuous position on the wall of the station for the purpose of calling a porter to assist in conveying baggage from one station to another.

The larger portion of the suburban stock is of the swing door type (average stops, 25 to 57 seconds). In times of pressure two guards accompany each train; one travels in front and signals to the guard in the rear of the train when his portion is clear.

To give stability to trains which have to stop and start very quickly, as in the suburban services, the coaches are linked up so closely that there is practically no play between the buffers, and all jarring is obviated.

Motor coaches are coming into use on several railways to act as feeders during the slack times of the day.

A motor bus connects Victoria Station with Paddington, and is utilized for the free conveyance of through booked passengers, with their luggage, and also the public, the latter being charged 6 cents per head.

It is a very common practice to see guards, who are awaiting orders, assisting on the platform with passengers' luggage.

At Victoria and London Bridge stations it is a very frequent occurrence to see horses led along the platform, while passengers are entraining, and put into horse trucks for conveyance by the same train.

BELGIAN STATE RAILWAYS.

Engines are mostly of the compound design, and are of the heavy modern type constructed for speed in the case of passenger and for haulage capacity in the case of goods trains.

The Belgian locomotive seems to me to be among the best met with on the Continent.

In general passenger traffic only second and third-class accommodation is used; the second-class compartment equals any of the first-class compartments I have seen, while the third class is also excellently finished.

With the exception of express trains, the speed of through trains is not extraordinary.

A good many tank engines are employed on these railways.

The Westinghouse air-brake is fitted to all rolling stock.

Passenger carriages are lighted mainly by electricity; the compartments are all well ventilated.

Two baggage racks are provided on each side of the compartment, which is also fitted with danger-emergency stop-signal cords.

Side-door corridor carriages are being introduced. The present carriages accommodate only three persons on each side. The old stock provided for a side. This is evidently not a satisfactory advance.

To encourage travel on the Belgian State Railways it is the practice to quote remarkably cheap railway fares for season and circular tickets.

It is possible in Belgium to obtain a season ticket to travel over the whole of the Belgian State Railways (2,530 miles), available for five days, at a cost of $5.80 first class, $3.90 second class and $2.25 third class.

Fortnightly season tickets, which enable the holder to travel as often as he likes in every direction over the Belgian State Railways, are issued at the following fares, which include one passage each way between Dover and Ostend: First class, $15.35; second class, $10.65; third class, $7.40.

It is necessary to supply a photograph when purchasing, so that it can be affixed to the ticket issued in order to prevent transfers.

Cheap circular tour tickets are issued by the Belgian State Railways in conjunction with other Continental railways at specially reduced fares. The railways, who are parties to this agreement, are the Belgian, German, Austrian, Swiss, French and Italian.

It is calculated that, on an average, there is a saving of 33⅓ per cent. between the circular tour and ordinary single ticket rates, the use of the former enabling passengers to plan out their route beforehand and to know the exact cost of their journey. Journeys may be broken practically at any station.

There is one drawback to the issue of these tickets, viz.: that no free allowance of luggage is granted, but handbags and luggage which is not bulky or likely to cause inconvenience to other passengers may be taken into compartments. Luggage may be forwarded in advance by goods trains.

The question of the introduction of ocean-rail tickets has been under consideration by the several railway administrations and steamship companies in South Africa, and an arrangement has practically been come to whereby ocean-rail tickets will be issued at an early date.

The result of my investigations more than convinces me that the early introduction of circular tour tickets will lead to considerably increased passenger traffic.

FRENCH RAILWAYS.

At certain suburban stations the platforms are marked off to indicate the exact position at which trains will stop. Some of the notices are painted on the concrete or stone platforms, such as "Second-class Carriages Stop Here."

On the Paris-Lyons-Mediterranean Railway pillows and blankets are issued to passengers at a charge of 10 cents each. For a lunch basket, including wines, a charge of $1 is made.

A special service is attached for the conveyance of milk and other descriptions of perishable farm produce traffic.

The coaches provide for three classes of passengers and are of the short side-door type of vehicle. They are not very well kept, being dirty and untidy in appearance, although in the first and second classes white lace antimacassars are provided in each compartment for the head cushions.

Disc signals are provided at all points.

Paris Metropolitan Suburban Railway.

Power: electricity supplied by side rail.

The train consists of from five to seven bogie carriages, with accommodation for 200 first and second class passengers.

Provision has been made for each saloon to be fitted with two double side doors.

One attendant is appointed to each carriage to see to the opening and closing of doors.

Train stops vary from 10 to 15 seconds.

The fares for the whole distance are as follows: First class, 5 cents; second class, 3 cents. But workmen can, before 6 a. m., purchase return tickets for 2d. each.

There is a double line of rails laid down throughout the whole system.

Tickets are procured at the booking office. They are punched at the entrance to the platform, and all first-class tickets are examined on the train. On arrival at destination the tickets are either

placed into a collecting box or retained by the passengers. The bulk of the passenger traffic is second class.

As an indication of the development of this particular type of traffic, which has been brought about by the frequent service and low fares, the following particulars are of especial interest:

1900, total passengers carried	15,890,528
1901, " " "	48,478,116
1902, " " "	62,122,728
1903, " " "	100,107,631
1904, " " "	117,550,521

Further particulars are afforded in respect of the 1904 traffic totals, viz.:

Collective tickets	13,994
First single tickets	14,533,336
Second single tickets	80,306,484
Return tickets	22,696,707
	117,550,521

The length of line operated is 22½ miles.

The running time for trains over this line is generally 35 minutes, which works out approximately at 38½ miles an hour.

In 1904 the number of carriages in service was:

Motors	249
Carriages	396
	618

The seating accommodation in the new stock is:

Seated	25
Standing in passage	5
Standing in open compartment	20
	50

The number of car miles run during the year 1904 was 20,185,934.

Automatic block signaling is in operation throughout the system.

All stations have been provided with high level platforms.

A very good suburban service is maintained.

Motors are provided in every alternate car.

There is a heavy passenger traffic which is moved very quickly and without any apparent effort.

No express trains appear to be run, although to cope with the traffic, which is still on the increase, more spacious and larger carriages are being provided.

Next to the Interborough Rapid Transit in New York, I regard the Paris system as the best in point of expedition. There are several features on the Interborough Rapid Transit of New York which it would appear advisable to adopt in similar services, *e.g.*:

1. There is larger carrying accommodation for passengers per car.
2. The door fastening and door control are better.
3. The speed is faster.
4. The express tracks are a decided advantage.
5. One fare is charged for any distance.
6. There is no distinction in class.

GERMAN STATE RAILWAYS.

Return tickets at less than two single fares are being abolished on the Government State Railways. They will, I understand, only be issued in future at the cost of two single fares.

At most of the large German stations an automatic ticket machine is placed near the entrance to the platform for the sale of penny platform admission tickets.

The rapid express from Berlin to Munich, by which I traveled, consisted of five bogie vehicles and an engine. Its composition was auxiliary bogie baggage van next to the engine, one dining car, two first-class saloons and one van. Gross weight of train about 200 tons.

Each saloon and berth is numbered, and a passenger, on presenting his ticket to the conductor, is shown to his reserved seat.

First-class accommodation only is provided, the charges being the ordinary first-class fare, plus 20 per cent. and the usual sleeping fee.

First and second class bogie stock, similar to Central South African Railways carriages with center corridor, has recently been introduced on other than suburban or express trains.

Second and third class side door passenger stock only is used for suburban traffic.

The third-class bogie carriages convey 10 passengers per compartment, or 66 passengers in all.

The windows, which are of the sliding type, stretch across the length of the compartment. The roofs are fitted with torpedo ventilators.

The open compartments are provided with a very suitable rack arrangement.

On through trains, at times of pressure of traffic, an enameled label plate, bearing the sign "second class," is placed outside the door by the conductor, when a compartment is altered from first class to second class.

On mixed trains the passenger carriages are placed next to the engine, the goods trucks being at the rear of the train.

The locomotives in use for suburban traffic are of the small side tank type.

The signal and gates at Neupenzberg are worked from the station at a distance of one mile. The installation is worked by double wire connections.

On certain of the lines, where the traffic is not very heavy, women are employed in maintenance work on the roadway, doing duty similar in all respects to that performed by plate-layers and gangers.

Each goods vehicle is marked with the number of the men and animals which it is capable of conveying in time of war. Generally the trucks are marked to carry 48 men or 6 horses. The military authorities of our own government would do well to consider these loads and contrast them with the loads carried during the recent war in South Africa, when only about one-half the number of men were placed in a truck of the same size, although the length of haulage and the time occupied in transit would be greater and longer, respectively.

I was much impressed, when traveling through Germany, by the fact that there is an evident lack of the commercial consideration in the management of the railways in that country. While, as is well known, the Germans as a body are advanced to a high standard of commerce, their railways undoubtedly bear a military aspect. There was invariably reticence in affording data connected with railway matters, more particularly in Prussia, which was rendered more significant by the knowledge that German railway officials had been given every facility for acquiring particulars of British railway practice.

JAPANESE MILITARY RAILWAYS.

In connection with the war lately terminated in the East, the Japanese Government built a short light military line and obtained for the working of this railway 370 eight-ton engines and 1,200 trucks.

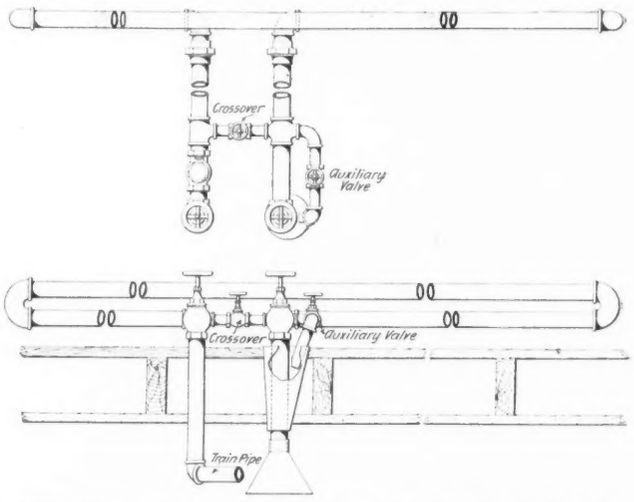
The material required for the building of this line amounted to 10,000 tons. The weight of rail was 23 lbs. per meter and the gage 2 ft. A similar railway was built for military purposes by the Russians.

In running these trains it is intended to run them with two engines coupled together.

The rolling stock and material was supplied by Germany.

The Parker System of Car Heating.

The Grand Trunk Railway is applying to its passenger equipment a new system of heating, which was devised by a conductor on that road. Its adoption by the Grand Trunk follows a thorough test covering a period of four years. The chief advantages claimed are the absence of escaping steam at the drips, and the low pressure with which effective and uniform heating of the train is accomplished. A drawing illustrating the application of the system to a passenger coach is shown herewith.



The Parker Heating System, Piping for Passenger Coach.

The peculiar features of this system are the admission simultaneously of live steam to *both* ends of the radiating pipes, and the closing during service of all drips or outlets except the one at the rear end of the train pipe. There is also provision for thawing out with live steam the discharge pipe should it freeze up. The only change required from the usual piping for the direct system is the insertion of the crossover, with controlling valve, between the supply and discharge pipes, and the piping and auxiliary valve for thawing out the discharge pipe.

The method used converts the usual direct steam system into a hot water system, the instructions for operation especially directing that any water of condensation present in the radiating pipe at the start should be permitted to remain, and all waste or drip valves, except on the train pipe, be closed and kept so until the end of the run. Then, if necessary, the accumulated condensation may

be blown out to prevent freezing. In blowing out, the crossover valve is closed, of course, permitting the steam to pass through the radiating pipes in the usual way. If the discharge pipe is frozen, by opening the auxiliary valve—the crossover valve being open—the pipe is thawed out by the live steam almost instantly. This may be done while the train is in motion, if necessary.

The system requires a relatively low steam pressure for the desired train temperature. It is claimed that tests have shown a 10-lbs. train-pipe pressure to maintain a uniform train temperature of 70 deg. F. and higher, with an outside temperature of 5 deg. below zero. We understand that even under extreme temperature conditions there is an entire absence of escaping steam around the train. The low pressure is not only economical as regards the demands on the locomotive boiler, but greatly reduces trouble from burst hose, defective pipes and connections, etc.

The cost of application of the system is, of course, very low—simply the small amount of material and labor necessary to make the two connections required, costing in all about $4. The patentee of the system is Thomas Parker, and it is being applied under the name of the Parker Anti-Freezing and Hot Water System, London, Ontario.

Uniform Live Loads for Railroad Bridges, and Shearing Stress in Webs of Plate Girders.*

BY A. W. BUEL, ASSOCIATE BRIDGE ENGINEER, WESTERN PACIFIC RAILWAY.

As a substitute for the system of live loads for railroad bridges consisting of two typical engines, followed by a uniform load per foot of track, the writer offers the following suggestion for discussion:

A live load per linear foot of track equal to

$$\frac{T}{\sqrt[3]{S}+\sqrt[6]{S}}$$

in which T, the index of the loading desired, has a value equal to the weight of each driving axle in pounds, and S is the length of the span in feet.

The values of T, approximately corresponding to the usual loadings of the Cooper series, are as follows:

$T = 40{,}000$, for Cooper's E-40,
$T = 45{,}000$, for Cooper's E-45,
$T = 50{,}000$, for Cooper's E-50,
$T = 55{,}000$, for Cooper's E-55.

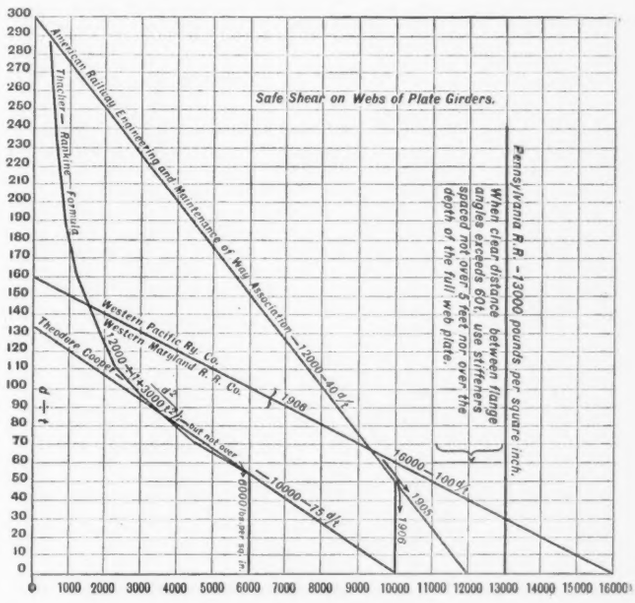
The table submitted herewith gives the value of $\sqrt[3]{S}+\sqrt[6]{S}$ for spans from 10 to 500 ft., and the live load per foot of track for the $T = 50{,}000$ loading. This table also shows the equivalent uniform loads for Cooper's E-50, for moment and shear, and the average, or mean, equivalent loads of the two.

TABLE OF UNIFORM LIVE LOADS PER LINEAR FOOT OF TRACK FOR SPANS FROM 10 FEET TO 500 FEET.

Span in Feet, "S"	$\sqrt[3]{S}$	$\sqrt[6]{S}$	$\sqrt[3]{S}+\sqrt[6]{S}$	Equivalent Uniform Load for Cooper's E-50. For Moment.	For Shear.	Average of Equivalent Load for Shear and Moment.	Uniform Live Load per Foot of Track. $\frac{50.000}{\sqrt[3]{S}+\sqrt[6]{S}}$
10	2.1544	1.4678	3.6222	12,250	15,000	13,625	13,804
15	2.4662	1.5704	4.0366	.....	.....	.....	12,387
20	2.7144	1.6475	4.3619	10,313	12,500	11,410	11,463
25	2.9240	1.7100	4.6340	.....	.....	.....	10,790
30	3.1072	1.7627	4.8699	9,125	10,500	9,815	10,267
35	3.2711	1.8086	5.0797	.....	.....	.....	9,843
40	3.4200	1.8493	5.2693	8,200	9,400	8,800	9,489
45	3.5569	1.8860	5.4429	.....	.....	.....	9,186
50	3.6840	1.9194	5.6034	7,613	8,700	8,160	8,923
55	3.8030	1.9501	5.7531	.....	.....	.....	8,691
60	3.9149	1.9786	5.8935	7,225	8,200	7,715	8,484
65	4.0207	2.0052	6.0259	.....	.....	.....	8,298
70	4.1213	2.0301	6.1514	6,975	8,000	7,490	8,128
75	4.2172	2.0536	6.2710	.....	.....	.....	7,973
80	4.3089	2.0758	6.3847	6,750	7,800	7,275	7,831
85	4.3968	2.0969	6.4937	.....	.....	.....	7,700
90	4.4814	2.1169	6.5983	6,600	7,600	7,100	7,578
95	4.5629	2.1361	6.6990	.....	.....	.....	7,464
100	4.6416	2.1544	6.7960	6,438	7,500	6,970	7,357
110	4.7914	2.1889	6.9803	6,425	7,360	6,895	7,163
120	4.9324	2.2209	7.1533	6,412	7,240	6,825	6,990
130	5.0658	2.2507	7.3165	.....	.....	.....	6,834
140	5.1925	2.2787	7.4712	.....	.....	.....	6,692
150	2.3133	2.3051	7.6184	.....	.....	.....	6,563
160	5.4288	2.3300	7.7688	.....	.....	.....	6,436
170	5.5397	2.3536	7.8933	.....	.....	.....	6,334
180	5.6462	2.3762	8.0224	.....	.....	.....	6,233
190	5.7489	2.3977	8.1466	.....	.....	.....	6,138
200	5.8480	2.4183	8.2663	.....	.....	.....	6,049
225	6.0822	2.4662	8.5484	.....	.....	.....	5,849
250	6.2996	2.5099	8.8095	.....	.....	.....	5,676
275	6.5030	2.5501	9.0531	.....	.....	.....	5,523
300	6.6943	2.5873	9.2816	.....	.....	.....	5,387
325	6.8753	2.6221	9.4974	.....	.....	.....	5,265
350	7.0473	2.6547	9.7020	5,050	5,150	5,100	5,154
400	7.3700	2.7150	10.0850	.....	.....	.....	4,960
500	7.9400	2.8170	10.7570	.....	.....	.....	4,650

From this table it will be seen that while the loading proposed is greater than the equivalent uniform load for moments of the Cooper series, for spans from 10 to 120 ft. in length, by from 9.2 to 17.5 per cent., it is only 2.0 per cent. greater for spans of 350 ft.

Compared with Cooper's equivalent load for shear, it is from 0.4 of 1 per cent. to 3.5 per cent. greater for spans from 40 to 80 ft., the higher value being for spans of 60 ft. For spans of 10 to 30 ft., it is from 7.6 to 2.0 per cent. less than Cooper's equivalent uniform load for shear, and for spans of 90 to 120 ft. it is from 0.4 of 1 per cent. to 3.3 per cent. less. For a span of 350 ft. it is practically identical for shear.



If we compare the proposed loading with the average of Cooper's equivalent uniform loads for both moment and shear, the excess of the former, in per cent., is as follows:

For a span of 10 ft., 1.7 per cent. excess
For a span of 20 ft., 0.8 per cent. excess
For a span of 30 ft., 5.0 per cent. excess
For a span of 40 ft., 8.0 per cent. excess
For a span of 50 ft., 9.5 per cent. excess
For a span of 60 ft., 10.0 per cent. excess
For a span of 70 ft., 8.6 per cent. excess
For a span of 80 ft., 7.6 per cent. excess
For a span of 90 ft., 6.9 per cent. excess
For a span of 100 ft., 5.5 per cent. excess
For a span of 110 ft., 4.1 per cent. excess
For a span of 120 ft., 2.5 per cent. excess
For a span of 350 ft., 1.0 per cent. excess

While these excesses are considerable for spans up to 110 ft., they are no more than the difference between the typical wheel loadings and the probable actual loadings. Taking into account the close agreement between the proposed loading and Cooper's equivalent uniform loads for shear, and the fact that the material excesses, compared with Cooper's equivalent uniform loads for moment, are confined to spans of 120 ft. and under, it is not unreasonable to expect it to give satisfaction in practice.

As most spans for which it gives excess moments would be plate girders, for which, in the past, many roads have required that "no part of the web shall be considered as resisting flange stresses," and as with this loading plate girders should be proportioned by their moment of inertia, plate girder spans so designed under this loading would be very little heavier than we have been building. The fact that it gives heavier loadings for short spans than for long spans, as compared with the Cooper series of wheel loads, will not generally be considered an objection, and the writer does not believe serious criticism will be advanced against the relatively heavier loadings for floor systems.

With almost identical loads for spans of 350 ft., it drops off so that for spans of 500 ft. the loading is about 10 per cent. less than Cooper's, and this, the writer believes, is as it should be.

Herewith is presented a diagram showing graphically several formulas for shear in plate girder webs and spacing of stiffeners.

The Thacher-Rankine formula is Rankine's formula, with

*Reprinted from Bulletin No. 75 of the American Railway Engineering and Maintenance of Way Association.

Thacher's constants and with d measured horizontally or vertically instead of on an angle of 45 degrees, and is, perhaps, one of the oldest, and has, possibly been more generally used than any of the others. This does not include impact.

The Pennsylvania Railroad permits a maximum shearing stress on *net* section of web plates, including impact, of 13,000 lbs. per sq. in., which does not seem unreasonable. The rule for the spacing of stiffeners, however, has no relation to the allowed stress per sq. in., which is constant, and, for the average values of $\frac{d}{t}$, permits a stress per sq. inch about twice as great as that of any other specification illustrated on the diagram.

Cooper's straight-line formula corresponds, very closely, with the older formula—$12{,}000 \div \left(1 + \frac{d^2}{3{,}000\ t^2}\right)$,—for all values of $\frac{d}{t}$ from 40 to 100. The writer believes Cooper's formula $\left(10{,}000 - 75\frac{d}{t}\right)$ is, everything considered, the best yet proposed where impact is not included. With impact included, for which case it was not intended to apply, Cooper's formula would give excessive webs and stiffeners, and should be modified.

The formula recommended by the Committee of the American Railway Engineering and Maintenance of Way Association—$12{,}000 - 40\frac{d}{t}$—gives stiffener spaces so much greater than either of the older formulas most generally used, that its recommendation or adoption as "standard" does not appear to be wise or conservative. It is better than the purely empirical rule of the Pennsylvania Railroad, but the formula $12{,}000 \div \left(1 + \frac{d^2}{3{,}000\ t^2}\right)$ was based on a rational theory, and Cooper's formula gives nearly the same results and is more practical in application. It is not clear why 12,000 is used as the base of the Committee's formula, when 16,000 is the base for both tension and compression.

The formula here proposed—$16{,}000 - 100\frac{d}{t}$—has been tentatively adopted by the Western Maryland Railroad and the Western Pacific Railway. It starts with the same base of 16,000 lbs. per sq. in., as is used for tension and compression, and includes impact, the same as the Committee's formula.

It is reduced by $100\frac{d}{t}$, so that for $\frac{d}{t} = 30$, the allowed stress is 13,000 lbs. per sq. in., at which point it crosses the empirical line of the Pennsylvania Railroad. For values of $\frac{d}{t}$ under 30, no good reason is apparent why the higher stress per square inch should not be permitted, especially as impact is included in the total stress.

When $\frac{d}{t}$ is about 67, the line crosses that of the Committee's formula, with an allowed stress of about 9,800 lbs. per sq. in. This is near the lower limit of the values of $\frac{d}{t}$ for webs of plate girders that will occur in ordinary cases.

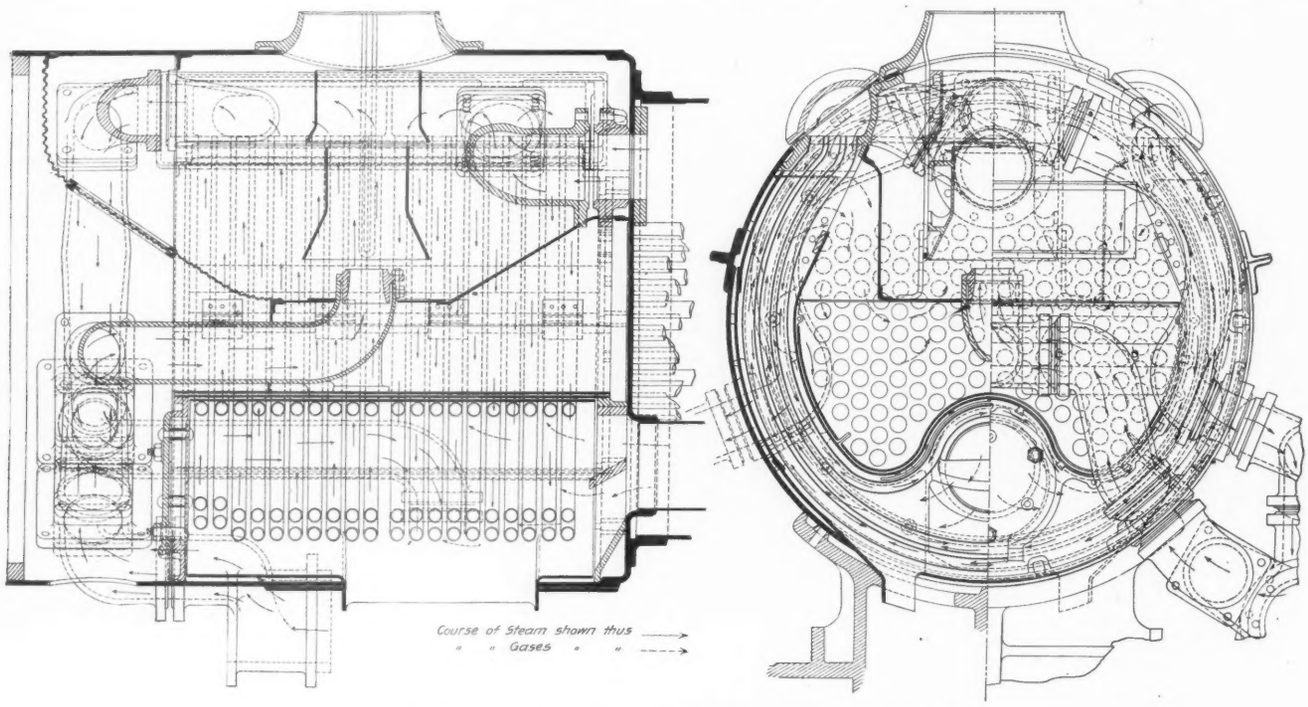
When $\frac{d}{t}$ is greater than 67, the proposed formula will require somewhat closer stiffener spaces than those of the Committee's formula, but not so close as the older Thacher-Rankine or Cooper's formulas, notwithstanding the fact that impact is not included in the latter.

The formula proposed, with impact added to the total shear, saves on an average, one pair of stiffeners for each 30 linear feet of girder, as compared with the Thacher-Rankine formula with no impact added.

An inspection of the diagram and the comparisons given above will show that the formula here proposed—$16{,}000 - 100\frac{d}{t}$—gives results between the extremes of past and present practice, and that it is both conservative and rational.

The Schmidt Superheater.

It is well known that of all the railroads on this continent the Canadian Pacific has been the most persistent in its efforts to encourage the use of the compound locomotive and, later, to develop the superheater. In this work the Cole and Schmidt devices have been used as well as the one designed by the officers of the motive power department. The Schmidt superheater as used abroad is of two forms known as the smokebox and fire-tube types, respectively. While the latter seems to have been most extensively applied to the locomotives of the Prussian State Railways the older type, though modified in detail, is the one that was first applied and used in the smokeboxes of the locomotives of the Canadian Pacific.



Schmidt's Smokebox Superheater, Canadian Pacific Ry.

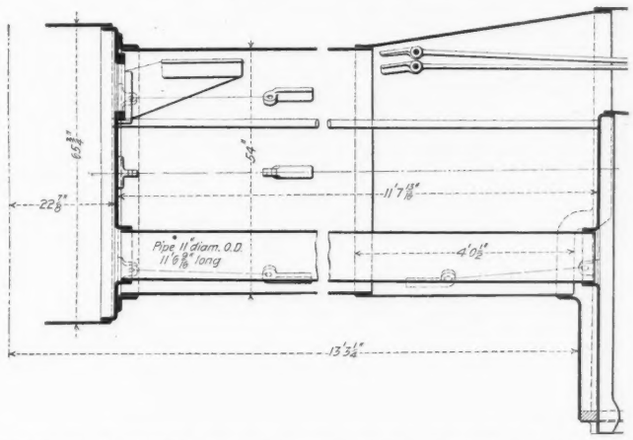
This type calls for a very marked change in the tube arrangement of the boiler. Instead of a nest of small tubes filling the boiler to the required height a number are replaced at the bottom by a large flue. In the case of the boiler illustrated this flue is 11 in. in diameter. Not only does it displace the tubes by its own large section, but it is surrounded by an ample water space to provide for a free circulation, so that in all about 28 tubes are omitted for this alone that could otherwise be used. In addition to this, the central row of tubes that are ordinarily used are left out, so that in all about 41 more tubes than are used could be put in. The 54-in. boiler shown has 158 tubes, each 11 ft. 9⅜ in. long, by which sufficient length of smokebox is obtained, though, on the whole, the heating surface is materially lessened; probably by about 20 per cent. below what could be given to a similar boiler without the superheater. The flue has a thickness of 5/16 in. and is riveted to flanges turned in on each of the two tube-sheets. The other fea-

tures of the boiler are of no interest so far as the superheater is concerned.

The smokebox is well filled with the superheater pipes and fittings, as will be seen from the engraving. The gases from the small tubes discharge beneath and back of the diaphragm as in an ordinary engine, and pass forward to the netting and thence to the stack as usual. The gases from the flue, which are, of course, hotter than those from the tubes, enter the nest of superheater tubes at the bottom and circulate through them. Quoting from Mr. Vaughan: "The steam from the dry pipe passes into the rear end of a header placed near the top of the smokebox on the right-hand side, which header is divided into a front and back portion by a transverse partition. From the back of the header the steam passes through the small superheater pipes to the rear end of a corresponding header on the left side, and from the front of that header through other superheater pipes to the front section of the right-hand header, and thence to the cylinders. The superheater pipes are curved to surround the gases flowing from the large tube, which then pass upward on each side and then into the smokebox proper. As in all superheaters of this type a damper is provided to close off the flow of gases through the superheater when the engine is shut off, as at that time there is no steam in the superheater pipes, and they would be damaged by the hot gases if they were allowed to pass through freely."

While this type of superheater has been extensively used in Germany its application in this country has been very limited, and although the results obtained have been very satisfactory, as almost any degree of superheat can be obtained by an adjustment of the gases passing through the large tube, the tube superheaters seem to offer more attractive conditions for American practice.

As will be seen from the engravings, there is considerable complication in the front end, together with a number of steam joints,



Boiler for Schmidt's Smokebox Superheater, Canadian Pacific Ry.

which, while they do not give very much trouble, are objectionable, mainly in the fact that the clips and bolts are difficult of access and the joints hard to make tight in the first place, although when this has once been done they do not seem to have a tendency to develop any leaks.

Regarding economy of action, as already stated, the amount of superheat can be brought up to almost any desired point, working conditions ranging from 550 to 650 deg. of superheat. Tests have shown the coal consumption to be below that of either the compound or the simple engine, giving a saving of about 20 per cent. as compared with either a two or a four-cylinder compound and 25 per cent. as compared with the simple engine of the same cylinder dimensions.

President Ripley Protests Against Reduction of Fares in Kansas.

Mr. E. P. Ripley, President of the Atchison, Topeka & Santa Fe, on August 1 published the following letter:

To the People of Kansas:

The company now owning and operating the Santa Fe Railway is a little more than ten years old.

Do you know that in that ten years the road has been largely rebuilt and largely re-equipped?

Do you know that the track on the main lines is as good as any in the country and better than most, and that the branches have also been improved in condition and service as fast as men and money could be obtained for the purpose?

Do you know that in order to accomplish these results the Santa Fe Company has spent in these ten years in Kansas alone not less than 17 millions of dollars, part of which was taken from earnings that might have been distributed to stockholders, and the rest borrowed?

Do you know that the road is fully worth to-day the amount of its total capitalization?

Do you know that in these ten years the preferred stockholders have received total dividends of only 28¾ per cent., or 2.87½ per cent. per annum, and that common stockholders have received but 21½ per cent., or a little over 2 per cent. per annum?

Does it strike you that these payments are excessive, or that those who risked their savings in the enterprise have received too great a reward? How does this return compare with those of the farmer or business man on his investments?

Do you know that in Kansas the passenger train mileage of the Santa Fe has about doubled in the last ten years and that its trains are as comfortable and luxurious as those run anywhere in the world?

Do you know that the passenger rates are as low as they are in any state west of Ohio and Michigan, notwithstanding that you have only 18 people per square mile, while Illinois has 86, Iowa 40, Missouri 45?

Do you know that many passenger trains in Kansas are run at an actual loss and solely for the accommodation of the public?

Do you know that while the people of Kansas would individually save but little money by a reduction of passenger rates, the effect of such reduction would be keenly felt by the railroads, because it would reduce nearly all interstate rates, so that for every dollar saved by a citizen of Kansas the railroad company would lose several thousand dollars?

If you know all these things to be true, what reason or excuse is there for demanding that your legislature pass a law attempting to reduce the passenger rates?

We think we can demonstrate to any court or other tribunal that a reduction in passenger rates is unjust, and is equivalent to confiscation of our property, but we do not want conflict with our patrons; we do not want to be continually litigating in the effort to preserve our rights. We believe that when the people know the facts the misrepresentations of demagogic politicians and a sensational press will not be regarded.

The Santa Fe desires to conduct its business fairly and with due regard to the rights of the public; it raises no objection to public supervision and reasonable regulation; it desires above all things to keep out of politics, yet, when attacked it must defend itself, and when the sole platform of a candidate is that he is "agin the railroads," we are fully justified in protesting against his election. That is what every man and every interest in the state would do if attacked.

If my statements are true you cannot believe that the agitation for a two-cent-rate bill is justifiable; if you doubt the statements, or any of them, I can prove them correct.

I do not desire to be drawn into a newspaper controversy with politicians or demagogues, but should this fall into the hands of any honest voter, who doubts my statements, or desires further information, I hold myself in readiness to answer any communication addressed in good faith.

Chinese Railroads.*

During the past few years a very sensible change has taken place in the attitude of the Chinese government towards railroad building. For many years the mandarin class has fought this mark of civilization with all the vigor of true fanaticism, examples of which appeared in the destruction of the line from Shanghai to Ausoung in 1877, and later in that of the lines from Pekin to Paoting-Fou, and from Pekin to Tientsin. Now, however, these people appear to have been brought to regard the railroad as a source of prosperity.

This new attitude seems to open an almost indefinite field of action to European ambition and activity; but the imagination should not be allowed to outstrip itself in this regard. While the Chinese like to come in contact with Europeans, their confidence in their own credit is such that they feel quite confident that, in a short time at least, they will be possessed of a personal technique that will enable them to keep for themselves all of the profits of the industrial enterprises that may be developed in their country.

Without attempting to encroach on the future, a brief review will be presented of the roads that have already been built or which are now building in Chinese territory.

The first attempt at railroad building was made by the English in 1876 at Shanghai. It was a short line only 9.3 miles long, connecting the city with its seaport. It was finished in June, 1876, but in October, 1877, the Chinese government saw fit to destroy it, and sent the rails to the coast of Formosa, where the sea and the climate soon destroyed them. This road was not rebuilt until 1898.

North-Eastern Railway of China.—We must go back to 1891 for the building of the second line, that of the North-Eastern Ry. of China, intended to connect the Kaiping mines with Tongkow and Tientsin. Up to 1895 the coal carried to that point was sent by river

*Translated from *Le Genie Civil.*

to Pekin and the territory reached by the Grand Canal and the tributaries of the Peiho. The extension of the line to Pekin asked for, at the time, by the mandarins of the region, was finished in 1898. At the same time the construction was pushed on towards the provinces of Pi-chili and Manchuria, as far as the Russian station of Inkow on the left bank of the Liao.

The Chinese line from Inkow to Pekin is built to the English gage of 5 ft. It consists of two divisions, one of 210.8 miles from Inkow to Chanhai-Kwang; the other of 233 miles, on to the city of Pekin. The running time over each division is 12 hours, and calls for frequent changes either accidental or provided for, due to the crossing of rivers.

As a matter of fact the road belongs to the Chinese government, but was built by English capital and is operated by an English syndicate. The operating force is divided between English and Chinese.

The Pekin-Hankow Line.—The exceedingly complex financial and administrative conditions that prevailed in building and operating the North-Eastern Ry. are to be found in all enterprises of the same kind that have been exploited in China. Although it has often had recourse to foreign capital, the Celestial government has never conceded its railroads to the nations so represented. The truth is that the Asiatic roads are in hands of native companies, working under the direct authority of the imperial administration. As an example of this, the text of three edicts is cited, which set forth the conditions under which the Pekin-Hankow line was built, and which may be considered as a sort of prototype for the control of new enterprises.

I.

"On the 14th day of the 9th moon of the 22d year of Kwang-Siu (Oct. 20, 1896), this imperial decree is set forth: "We have communicated with the princes and ministers of the Tsung-li-Yamen directing that they examine the report that has been addressed to us jointly by Wang-Wen-Cho and Tchang-Tche-Tong, regarding the construction of a railroad from Lou-Kew-Kiao to Hankow (the starting point of the line is Lou-Kew-Kiao, a town located a few miles from Pekin), as well as the proposition to create a company whose direction shall be confided to Sheng-Kwang-Houci.

"In the report which was presented to us a short time afterwards by the Tsung-li-Yamen, it is stated that, in accordance with our will, reports have been asked from Sheng-Kwang-Houci; that, according to these, all precautions have been taken and everything correctly reported. He asks our authorization to form a company, of which we should name him as director, for the purpose of building a rail line from Loul-Kew-Kiao to Hankow as well as from Sow-Tcheow to Shanghai and from Canton to Hankow, which will be taken up later.

"The company is to furnish its own capital and will float a foreign loan; will establish a fund for depreciation, and the government will furnish the funds. It is to be hoped that the state officials and merchants will associate in this matter so that these great works may be quickly finished.

"It is also stated in the report of the Tsung-li-Yamen that the line from Lou-Kew-Kiao to Hankow, being the principal line, cannot be made double-track, since it would then be impossible to build it first.

"A copy of the note communicated by Sheng-Kwan-Houci, having been submitted to our august attention, we have finally summoned the latter to an audience and having found all the details that had been laid before us to be true, we have commissioned the said official to use every effort in the execution of the works for which we have issued plenary powers. We have furthermore directed that Wang-Wen-Chao and Tchang-Tche-Tong should busy themselves with the enterprise." Decreed herewith.

II.

"On the 24th day of the 4th moon of the 23d year of Kwang-Siu (May 25, 1897,) we have received the following note in vermillion: That the parties have conformed to the decrees." Decreed herewith.

III.

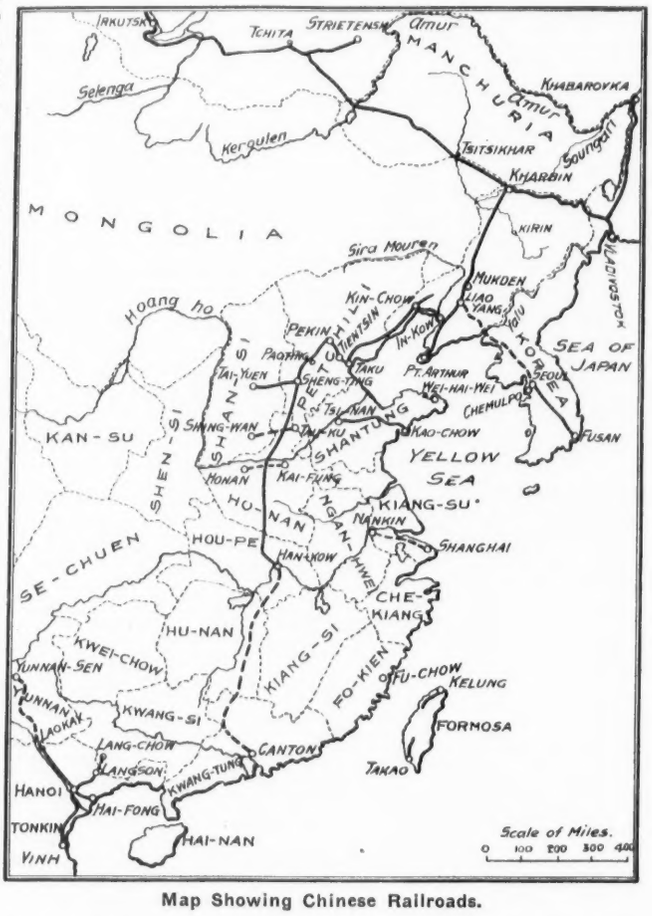
The 24th day of the 6th moon of the 24th year of Kwang-Siu (August 11, 1898). The report presented to the Throne by the Superintendent of Commerce of the ports of the North, the Viceroy of the Hon-Houng and S. E. Sheng relative to the additional contract of the Belgian loan for the railroad from Lou-Kew-Kiao to Hankow, and containing a copy of the new contracts for a loan and operation, received the following imperial acceptance in vermillion on the 24th day of the 6th moon of the 24th year of Kwang-Siu (August 11, 1898). The parties have conformed to the agreement. Decreed herewith. SEAL.

It appears that after a failure to obtain a national subscription, the Emperor Kwang-Siu authorized Sheng, the Director-General of the Imperial Chinese Railway Company, to negotiate abroad in order to obtain the funds in the way of a loan. But this resolved itself into a question of a concession to a French or Belgian company.

A loan of $22,400,000 was subscribed by Belgium in which French capital played a preponderating role, and was issued in the form of reimbursable obligations in the shape of 20-year bonds starting from January, 1909. In case of an earlier payment of the loan of the Chinese government, which was made possible after Sept. 1, 1907, the contract becomes null and the Belgian company will be turned out.

The construction of the railroad is under the direction of a chief engineer appointed by the Belgian company, but he is entirely subject to authority of the Director-General of the Imperial Chinese Ry. Co. The personnel of the force is selected and presented by the Chief Engineer, but is appointed by the Director-General, who reserves the right of discharge where satisfactory service is not rendered. Furthermore, the director has an absolute right of control by means of Chinese or foreign agents chosen by him, whose duty it is to report but who have no authority to give orders direct to the staff.

In case of dispute between the Belgian company and the Chinese government, the difference is to be submitted to the judgment of a member of the Wai-you-pou and the Belgian Minister in China; in the case of a disagreement between these two, the final



Map Showing Chinese Railroads.

decision shall be rendered by the Minister at Pekin of that foreign country which shall have shared in the loan, namely, France.

In the matter of operation, the Belgian company has more authority and power of initiative. It is called upon to direct, administer and operate the line.

The Chinese Railway Co. has merely the right of control over receipts and expenditures. A saving clause for the interests of the mandarinate is to the effect that, as far as possible, the supplies needed for maintenance and repairs shall be ordered from the shops and mines dependent upon the Director-General of the Chinese Railways. The line, which is of the standard gage, has a length of 744 miles; it crosses throughout its entire length the great alluvial plain, 372 miles broad, which extends from the foothills of the Tibet plateaux to the sea. At one point only, before reaching Hankow, it crosses the crest of the ridge separating the valleys of the Hoang-Ho and the Yang-tse-Kiang, on grades 1.5 per cent., with a tunnel about 1,150 ft. long. After traversing the three rich provinces of Pe-Chili, Ho-Nan and How-Pe it reaches Hankow, 682 miles from the sea, on the left bank of the Yang-tse-Kiang, at the mouth of which Shanghai is situated.

Important as Hankow is from the standpoint of its population (about 1,500,000) it is none the less so from that of its situation. The river is navigable for vessels drawing 23 ft. of water, and

in 1904 its shipping amounted to 5,320 vessels, with a tonnage of 3,372,000. The amount of its foreign exchange was $110,000,000, of which $13,000,000 was from sales of tea. Between Shanghai and Hankow there are a number of important cities, among them Nankin. Here, then, are all the elements of an important traffic for the new line which was opened throughout its whole extent on the 12th of last November, after the completion of the great bridge of 1.86 miles long over the Hoang-ho, a bridge of 120 spans of from 100 ft. to 160 ft. each.

The Chan-Si Line.—French engineers traveling in China at different times have been impressed with the many and varied resources of the Province of Chan-Si. Situated at the west of Pe-Chili, surrounded on all sides by mountain chains, Chan-Si, whose area is about equal to that of the British Isles, occupies the first step in the ascent to that great plain of the east, in the direction of Tibet and Mongolia. Its average altitude is between 2,500 ft. and 3,500 ft. The eastern slopes are steep and formed of granite rocks. To the west it is not so steep, and the slopes are formed of a loamy mixture of clay and sand.

This province contains great mineral riches; 150,000 tons of anthracite coal are taken every year from the Ping-Ting mines by caravans of camels, asses and mules. The population is as dense as in the most thickly settled departments of France. These are the advantages which this province offers for the construction of a railroad penetrating into the heart of China.

Negotiations, entered into by the Russo-Chinese bank, resulted, in 1902, in two related contracts: one for the issue of a loan and the construction of a road, and the other for the operation of the same. Soon after the floating of this loan, the Russo-Chinese bank withdrew and handed the business over to the "Societe Francaise de Construction et d'Exploitation de Chemins de fer en Chine" (French company for the construction and operation of Chinese railroads), which was definitely incorporated on Feb. 12, 1904. The general organization of this enterprise was modeled after that of the Pekin-Hankow line, though some modifications were introduced in the matter of the foreign contingent of the force, the creation of special services for the authorities, etc.

The contract for the operation of the road runs for 30 years, as in the case of the Pekin-Hankow road, and expires when the full payment of the loan has been made. The road has a length of about 155 miles, and it is now being built. From its starting point on the outskirts of the city of Cheng-Ting, a place of 50,000 inhabitants, it runs to the southwest and reaches the high mountains almost at once. We will not enlarge upon the topographical difficulties which the execution of the Chan-Si line presents; they lie, for the most part, in the crossing of the great rivers, as well as in numerous ravines, formed by the loess, and extending in all directions, and whose perpendicular sides are frequently several hundred feet high. The meter gage has been adopted to facilitate the passage of obstructions with short radius curves.

The line is divided into two distinct sections. The first starts from the Pekin-Hankow road at the Tchen-To station, 9.3 miles south of Cheng-Ting-Fou, on the right bank of the Ho-To-Ho, which empties into the Tientsin; rises somewhat to cross the Hsi-Ban, a tributary of the Ho-To-Ho, and then enters the valley of the Chih-Ho, which it ascends to its source, 94.25 miles away. It is expected that the first part of this section, 46.5 miles, will be opened this year, the terminus of which will be Nang-Tsu-Kuan. The second section, which will start from the Ping-Ting station, the center of the coal operations, will offer many difficulties in construction, and many important works will have to be executed. The third section will extend from Ping-Ting to Shou-Yang.

The section of the line which is to descend from the summit of Shou-Yang towards the Yellow river has not yet been decided upon in detail, as the difficulties of construction have brought out two alternative routes which are now under discussion and examination. As the method of construction does not permit a serious undertaking of the work beyond Shou-Yang, before the lapse of a certain time, the delay due to this examination offers no serious inconvenience.

The Yun-Nan Line.—A new line, whose construction is of special interest to France, is now being built on the southwest frontier of China, from the point of contact with the Province of Tonkin. At the diplomatic convention of April 10, 1898, China conceded to the French government a line connecting Tonkin with Yun-nan-Sen, the capital of the Chinese province of Yun-nan. It will form a prolongation of the French railroad running up to the valley of the Red River from Hanoi to Laokay, a frontier town, and will develop the outlet of the rich Province of Tse-Chou-an into Tonkin.

The construction of the Chinese part, with a length of 286 miles, and the operation of the entire line from Hanoi to Yun-nan-Sen has been confided to the Compagnie Francaise des Chemins de fer de l'Indo-Chine and Yunnan (French Railroad Company of Indo-China and Yunnan). The portion from Hanoi to Laokay is being built by the colony. Work on this line, which is meter-gage, is at present being made difficult by the local authorities, who pretend that it will be bad for native labor.

Line from Taokow to Chin-Huan.—This road, starting from the valley of the Yellow river, lies practically at right angles to the Pekin-Hankow line, which cuts it into two unequal parts. The right to build it was conceded in 1898 to a very strong English company known as the "Pekin Syndicate," in order to serve important concessions which this company had obtained in the Provinces of Chan-Si and Ho-Nan. Work was commenced in 1902 to connect by means of a standard gage road, Ching-Huan, in the mining region, with Taokou, on the Wei river, whence the output of the mines can be taken by water to Tien-Tsin.

In 1904, 75 miles had been built and the principal mining centers reached. The Chinese government then entered into negotiations with the Pekin Syndicate for the purchase of the line. These negotiations were terminated in 1905 by an agreement, according to which the Chinese government obtained possession not only of the part that had been built but of that which was building; about 90.5 miles. The Pekin Syndicate was authorized to issue a Chinese loan of the Pekin-Hankow type of $3,150,000, forming the payment for the line and the funds for the rolling stock wherewith to operate it, which was granted for a period of 30 years.

Shanghai-Nankin Line.—After the signing of the Pekin-Hankow contracts England claimed that China had failed to carry out previous agreements and demanded compensation. As a result of this the British and Chinese Corporation obtained an authorization to build a road from Shanghai to Nankin in 1898. Still, it was not until 1904 that the enterprise was set upon a definite footing, similar to that of the Pekin-Hankow and Chan-Si lines, by the issue of a 5 per cent. government loan or one secured by bonds upon the line and guaranteed by the government. It puts Shanghai into communication with Nankin. This road, which is about 186 miles long, crosses a level country, but one that is cut up by innumerable streams and canals. The Blue river, upon the right bank of which the city is located, is navigable by heavy draft vessels and will form a powerful competitor. The road is now being built from each end, and has been opened over that portion (10 miles) which, demolished in 1876, was rebuilt in 1898.

Kai-Fong-Fou and Ho-Nan-Fou Line.—In November, 1903, a concession for this road was granted to a Belgian company known as the Compagnie Generale de Chemins de fer et de Tramway en Chine (General Railroad & Tramway Company of China). The contract was made upon the same basis as those of the Pekin-Hankow and Chan-Si Lines. Up to the present it has issued only one-half of the loan, which will amount to $5,000,000. This road from Kai-Fong-Fou to Ho-Nan-Fou, a distance of 155 miles, will follow the left bank of the Yellow river, and will connect with the Pekin-Hankow line at the point where it crosses the river. Construction has begun.

Province of Chan-Toung Line.—This is an entirely independent enterprise, for which the Chinese government gives no guarantee, and is being built by a German company known as the Chantung-Eisenbahn-Gesellschaft (Shantung Railroad Co.). It will be 270 miles long, connecting Tsi-Nan-Fou, the principal city of the Chan-Toung peninsula, with the port of Kiao-Tcheou. The gage will be one meter.

Canton-Hankow Line.—This will be one of the main arteries of travel, forming, with the Pekin-Hankow line, of which it will be an extension, the great north and south road of China. An American syndicate, to whom it had been conceded in 1898, having been somewhat slow in building the first 23 miles between Canton and the important port of San-Shin, the Chinese government took advantage of the default and placed the road on its general program. It bought the concession by reimbursing for expenses incurred in surveys and construction to the amount of about $3,500,000. A loan of $5,000,000 has been floated with the Bank of Hong-Kong, secured by the receipts for opium customs in the Provinces of Hon-Pe and Ho-Nan. The sum of $3,400,000 has been paid to the American syndicate, and the remaining $1,600,000 will be used in building the road. It is expected that there will be a strong competition to build and operate this line, which the Chinese government will undoubtedly wish to arrange for on the same basis as the others. Although the question has entered into the negotiations it is, as yet, impossible to state the result. Important as this concession is, it is not the only one sought for, and we find besides the European nations both Japan and the United States in the ranks of the bidders. Success in this will depend more upon the ability of the diplomats having the matter in charge than upon that of the capitalists and engineers. In short, from 3,000 to 3,600 miles of railroad, corresponding to the actual needs of the country, are actually being surveyed or are in different stages of negotiation.

But it must not be forgotten that these enterprises involve numerous risks, as well as offering a chance for profits and an increase of the sphere of influence, etc. It will, therefore, be the part of prudence to weigh them in advance before entering upon a program hastily.

For a number of years the customs, prejudices and even the hostility of the Chinese people have increased the amount of these risks. The change in the point of view that has been brought about

in the minds of the governing classes, facilitating the work as it has, still leaves a wide margin of uncertainty in the result; and the difficulty of securing contracts will be accentuated as the Chinese government comes to understand the profits that can be made out of such enterprises. On the other hand, the question of operation and traffic presents itself with all of its ramifications. The small lines running to the ports will be sure of sufficient traffic, but will it be the same with the trunk lines of the interior, serving a population that is frequently very poor and oppressed by the exactions of the mandarins? The question is whether the railroads can struggle victoriously against common customs and the economical transportation of water in a country where time and speed are negligible quantities.

Hence it appears that the question of Chinese railroads is one of the diplomatic rather than the technical order; a point that must never be forgotten.

The Deformation of Railroad Tracks.

In a special investigation into the influence of the tie on track deformations, experiments were made with wooden ties of different lengths and also with a steel tie in use on the State Railway of France, and a composite one formed of wood and steel. This composite tie is formed of two U bars laid with the legs up and holding between them two rectangular blocks of wood about 27½ in. long, separated by an empty space. The points studied were the creeping of the rails, the variation of the gage on straight lines and curves, vertical and horizontal displacement of rails, the compression of the wood in the line of the support, the drawing out of the spikes and the blow delivered at the joints.

All of these appear to be the result of two main movements, the transverse and vertical. The transverse movement results because the tie is not only forced down into the ballast, but is bent by the passing load so that it does not sink uniformly throughout its whole length. Hence the pressure is not carried evenly down into the ballast, but is greatest directly beneath the rails. It has been generally supposed that a loaded tie carried its burden throughout its whole length, and that, in order to lessen its depression into the ballast it was merely necessary to lengthen it. But these investigations have shown this supposition to be wrong.

Long ties, that is to say those more than 7 ft. 6 in. long, are bent under the action of the load, on a curve whose concave side is uppermost, with a slight bellying at the center, and an inclination of the rails towards each other.

Short ties, that is those less than 6 ft. 10½ in. long, bend on a curve whose convex side is uppermost, and the rails are tilted away from each other.

It would seem that between these two forms there should be one where there would be a vertical displacement on a straight line, without an inclination of the rails in either direction. Observation has shown this to be the case with wooden ties whose length lies between 6 ft. 10½ in. and 7 ft. 2½ in. The composite ties referred to, with blocks loaded at the center, also give very good results from this point of view.

Experience has confirmed the fact already known, that pressure transmitted to an elastic body (the ballast and soil) through a rigid elastic mass (the tie) when nearly constant near the center of loading, diminishes rapidly on receding from that point. Practically, with the current dimensions of ties and ballast, there is no object in extending the supporting surface more than 14 in. on either side of the rail. Tamping the tie is useful only throughout the length and distance that corresponds to an effective distribution of the pressure. At all other points it is a detriment in that the tie is strained if it rests upon its ends or center, and so deflects excessively and abnormally. It is, in a way, suspended from points where the load is naturally the least.

The vertical movement is also a matter of importance. Before the arrival of the load each tie is first raised; then, as the load approaches, it descends and is embedded in the ballast below the position it originally occupied. The rail takes on a sinusoidal form and presents to the wheels a series of undulations. The use of very rigid rails, and stiffer ties, can reduce the tractive force by 30 per cent. and the movement of the joints by half.

The suppression of the shock or blow at the rail joints, due to the vertical movement, has long attracted the attention of engineers. Attempts have been made to secure an elastic joint by the use of suspended joints. But they have thus created single points of depression, having a much greater deflection than others in the immediate vicinity, especially at the ties. This deflection has been measured by means of a special apparatus and has been found to be as much as $\frac{7}{32}$ in., whereas the yielding of the tie would not quite reach ⅛ in. It is best, then, to support the joint in order to avoid that so-called elasticity which is the cause of the destruction of the rail and rolling stock. If the deflection of the ties and the movement of the joint can be avoided, it will undoubtedly make it possible to attain even higher speeds than at present.

M. G. CUENOT, in the *Moniteur Industriel.*

New Southern Pacific Steamships.

The first of threee steamships building for the New York-New Orleans passenger service of the Southern Pacific Company was launched at the Cramp yards in Philadelphia last week. This vessel, named the Momus, is a full powered steel passenger and freight coastwise steamship, 440 feet long, 53 feet beam, and of 17 knots speed. Her loaded displacement will be 10,200 tons, and her gross tonnage about 8,000 tons.

She is a single screw; has three double-ended and four single-ended Scotch marine boilers designed for 230 pounds steam pressure. Her engines are vertical-inverted, direct-acting, triple expansion.

There are accommodations for 152 first-class, 58 second-class and 250 steerage passengers. The dining room is on the main deck forward, and has a seating capacity of 162. There is a library forward on the saloon deck, and smoking room, bar and barber shop are aft on the promenade deck. There are four luxurious suites with two rooms, brass bedsteads and baths. There are twelve bathrooms, in addition to the privatee baths of the suites, which, with toilet rooms, have artificial ventilation.

She is specially constructed to handle cargo in the most expeditious and economical manner, for which purpose she is provided with overall side hatches and side ports in the lower decks, having a cargo capacity of 4,000 tons. She has refrigeration for 100 tons of perishable freight.

Two sister ships, the Creole and the Antilles, of the same general dimensions, are to follow. The Southern Pacific purchased the Cromwell Line of passenger steamships running between New York and New Orleans several years ago, the purchase including the vessels Comus and Proteus, now used in the service, and the steamship Louisiana, which no longer runs between New York and New Orleans. The Comus and Proteus are excellent passenger vessels of about 5,000 tons, and run at a speed in the vicinity of 15 knots. The new vessels, 3,000 tons larger and two knots faster, will be the largest coastwise steamers on the Atlantic seaboard. The next largest steamer now engagd in strictly coastwise service is the San Jacinto, of the Mallory Line, a 6,000-ton vessel running between New York and Galveston. The new Ward boats, named Merida and Mexico, running between New York and Havana, are of 5,000 and 6,500 tons, and the Morro Castle, in the same service, is of 6,000 tons. Two new steamers of 8,000 tons are also building for the Ward Line. Until the former Mexico and Havana, now sold to the government for use in the Panama service, were built for the Ward Line, the largest coastwise steamers engaged in regular service were about 4,500 tons. It will be seen, therefore, that in the last ten years the size of the largest steamers has nearly doubld. It is noteworthy that the tradition of single-screw steamers for the coastwise trade has not been broken even in the case of the new Southern Pacific boats. The Ward Line has been building twin-screw steamers for some years, beginning with the Havana and Mexico, previously mentioned, but with these and two other exceptions there has never been a twin-screw steamer on the Atlantic Coast engaged in regular deep-sea coastwise service. The other exceptions are the San Jacinto and the City of Savannah (formerly La Grande Duchesse), built by the Plant Line and bought by the Ocean Steamship Company of Savannah some years ago.

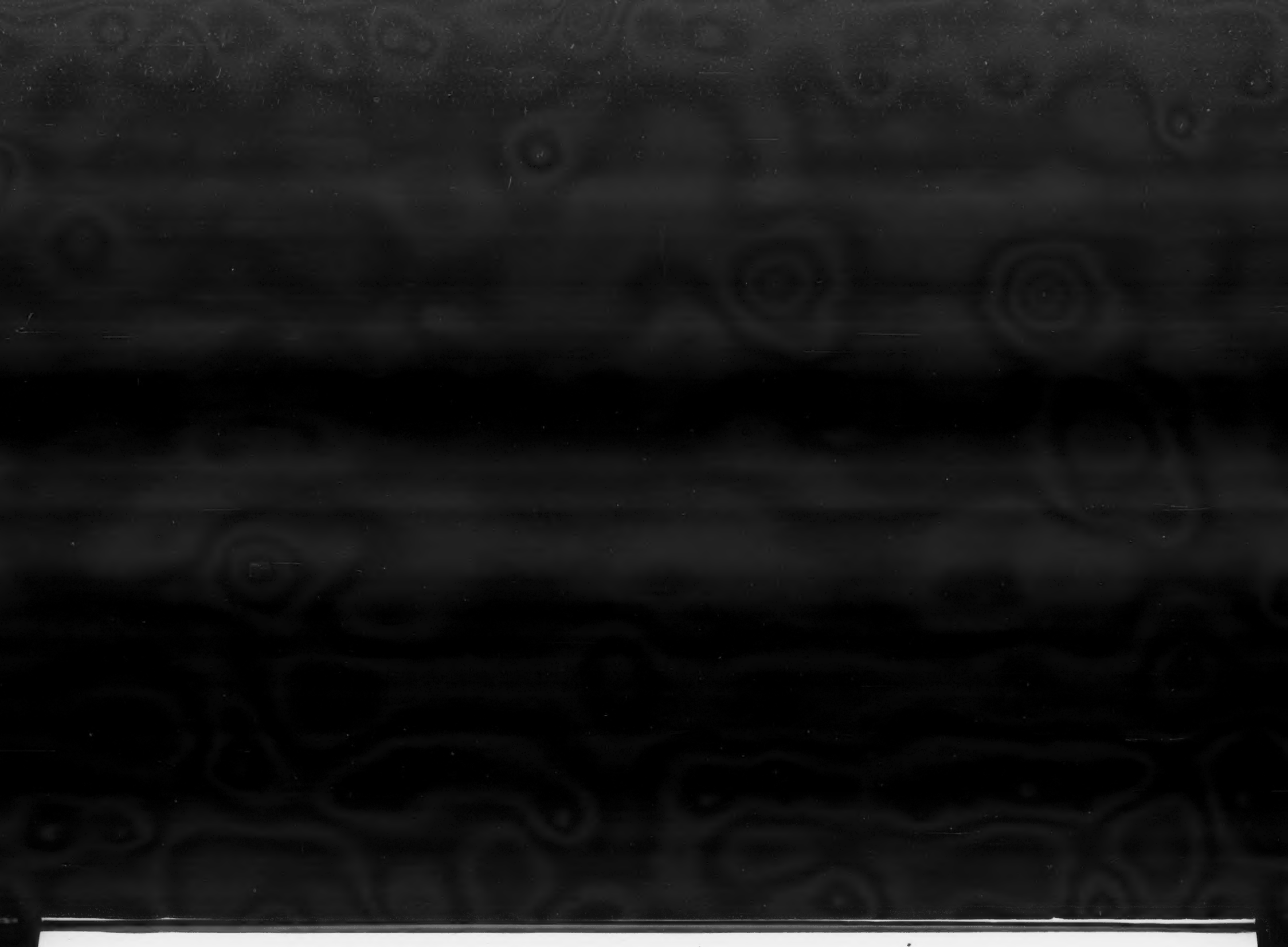
The Southern Pacific has found its New Orleans passenger service very popular and profitable. The two steamships now in service have not been sufficient to meet the increased traffic since the line was put under the excellent management of the railroad company. The sea trip is five days at present, but the new steamers should be able to reduce this somewhat. In connection with the two now in service, they will supplement the excellent fleet of 5,000-ton fright steamers operated by the company between New York and New Orleans and Galveston under the name of the Morgan Line.

Foreign Railroad Notes.

The railroads, posts, telegraphs and telephones owned and operated by the Belgian Government showed an increase of $2,000,000 in receipts last year, as compared with 1904. There was no increase in railroad mileage, which is still about 2,500 miles.

The latest (to date) Italian Minister of Public Works, Signor Gianturco, is a lawyer, and professor in a law school, a member of Parliament since 1889, and an eminent orator. He has at different times been Minister of Education and Minister of Justice.

The Japanese control the Manchurian Railroad, and a despatch from Tokio says that a special low rate has already been introduced on the railroad for Japanese tobacco and a few other commodities. This action is giving rise to serious apprehension among foreigners interested, as they fear that through manipulation of the railroad rates special advantages may be afforded to Japanese goods and the spirit of the open door nullified.



GENERAL NEWS SECTION

NOTES.

The Governor and Executive Council of Iowa have fixed the valuation of the railroads of the state for taxation at $62,289,775, which is $4,099,586 larger than in 1905.

The Western Union Telegraph Company has secured rights between Great Falls and Butte, Mont., over the Great Northern, and now uses the wires of that road for commercial purposes throughout the Great Northern lines.

On July 31 a special officers' train over the Canadian Pacific was run from Winnipeg to Moose Jaw, 399.2 miles in eight hours. This included water stops, a change of engines and two meetings with regular passenger trains.

The railroads centering in Minneapolis have secured a temporary injunction against the ticket brokers of that city and St. Paul restraining them from dealing in the round-trip tickets which are to be issued for the encampment of the Grand Army of the Republic in Minneapolis.

The large flour warehouse of the New York Central at West Albany, used by Henry Russell, was destroyed by fire on August 3, together with 35,000 barrels of flour and several freight cars. Loss, $300,000. The building was 1,900 ft. long and 35 ft. wide. The wire sign on the top of the building, running its whole length, cost $5,000 and was insured for $4,000.

It is announced in Philadelphia, apparently on the authority of some officer of the Pennsylvania, that the line to Atlantic City, which is being electrified, will be ready for operation by electric power on September 10. There have been so many unforeseen delays that it was found necessary to postpone the establishment of elctric train srvice until after the close of the heavy travel of the summer.

At St. Paul, August 6, President Stickney, of the Chicago Great Western, testifying before the State Railroad Commission, said that the practice of filing new freight tariffs very frequently and for small changes had now become very common among the railroads of the West, so common that the practice may be said to take the place of the secret rebating and other forms of manipulation formerly practiced.

Press despatches from London, August 2, reporting the half-yearly meeting of the shareholders of the London & South Western, represent the Chairman, Sir Charles Scotter, as saying that the speed of the train which was wrecked at Salisbury, July 1, was over 60 miles an hour, and that the rule required a speed well under 30 miles an hour. Up to the time of the Salisbury disaster no passenger had been killed on the London & South Western since January 1, 1889.

The city of Harrisburg has begun a suit in the County Court to prevent the Pennsylvania Railroad from using within that city any of the water obtained from the sources outside the city recently acquired by the company and made available at different places along the line of the road by extensive pipe lines. The railroad is now paying the city of Harrisburg $15,000 a year for water, and the city contends that it alone has the right to supply water within the city.

At Long Island City, N. Y., August 3, President Ralph Peters, of the Long Island Railroad, appeared before Magistrate Mathew Smith to answer a criminal charge concerning the nuisance of soft coal smoke from the railroad company's locomotives. The examination of Mr. Peters was set for August 10. It appears that the city officers have concluded that the numerous arrests of locomotive enginemen which they have made are not having the desired effect of suppressing the nuisance.

The State Corporation Commission of Virginia, which recently decided that the Legislature had no power to pass a law requiring railroads to furnish mileage tickets at 2 cents a mile, did so on the ground that the constitution lodges all such power in the hands of the Commission itself; and, pursuant to its duty, thus interpreted, the Commission now proposes to limit all fares, and announces that on November 1 it will hear any one who wishes to object to a proposed order limiting all fares throughout the state to 2 cents a mile.

The State Tax Commissioners of Oregon have made up their return of the values of railroads in the state, and the total is 69½ millions, as compared with less than eleven millions by the last preceding valuation. The former valuation was based on that made by the county assessors, whose rule was to value railroad property at about 15 per cent. of its true value, though other property in the state was taxed at about 33 per cent. of its actual value. The higher valuation now fixed by the State Tax Commission is based on the net earnings of the railroads, capitalized at an arbitrary percentage.

The Virginia State Corporation Commission has ordered the railroads of the state to maintain telephones at every passenger and freight station and to be prompt and polite in answering inquiries over the wires. This action is taken in pursuance of a law which was passed last March, making it the duty of railroads to maintain telephones at every station which could be conveniently connected with an exchange not more than 25 miles distant. The statute empowers the Corporation Commission to inflict fines for non-compliance. September 1 is the date fixed for the Commission's order to go into effect.

Master Blacksmiths' Convention.

The fourteenth annual convention of the International Railroad Master Blacksmiths' Association will be held at the Sherman House, Chicago, on August 21, and will last for three days. The following subjects will be discussed: Frogs and Crossings; Flue Welding; Classification of Work in the Shop; Tools and Formers for Bulldozers; Steam Hammers and Forging Machines; Discipline, and How to Obtain the Best Results in a Railroad Blacksmith Shop; Case Hardening Methods; Best Method of Annealing and Tempering High Speed Steel; Best Coal for Use in Blacksmith Shop and Kind of Fires Used; Subjects for 1907 Meeting; Piece Work vs. Day Work; Thermit Welding and Casting; Making and Repairing of Locomotive Frames. A. L. Woodworth, Lima, Ohio, is Secretary and Treasurer.

Further Prosecutions Under Coupler and Brake Law.

Attorney-General Moody has directed prosecutions of the following railroads for violations of the safety appliance act: Belt Railway of Chicago, Chesapeake & Ohio, Chicago & North-Western, Chicago, Burlington & Quincy, Chicago, Rock Island & Pacific, Elgin, Joliet & Eastern, Grand Trunk Western, Kansas City Southern, Minneapolis & St. Louis, Missouri Pacific, St. Louis & San Francisco, St. Louis, Iron Mountain & Southern, St. Louis Southwestern, Southern Railway, Union Pacific, Union Railway Company (of Memphis), Union Stock Yards Company of Omaha.

Holding Company for N. Y. C. Coal Properties.

The Beech Creek & Eastern Coal Company, recently announced in New York City, with a capital of $8,000,000, has been formed to take over the coal mining companies in western Pennsylvania which are controlled by the New York Central & Hudson River Railroad, and which, in accordance with the new Federal law, must be separated from the railroad. The mines included in the new arrangement embrace 117,000 acres of coal lands in Cambria, Blair and Indiana counties, Pennsylvania, and 1,000 coke ovens.

French Engineers in America.

Messrs. Jacques Le Chatellier, Jacques Danlos and Paul Nivoit, engineer officers of French railroads, are now in America studying railroad practice, with a view, it is said, to embodying in the plans for certain new railroads which are to be built in France any useful lessons which they may learn here. The visitors have passed over the Intercolonial, the Grand Trunk and the Canadian Pacific, and expect to go to the Pacific Coast before they reach New York and Washington.

Charles A. Bragg.

Charles Addison Bragg, District Office Manager of the Westinghouse Electric & Mfg. Company, at Philadelphia, died in that city on Sunday, July 29, after an illness of over two months' duration. Mr. Bragg was one of the pioneers in the electrical business, and was associated with the United States Electric Lighting Company as early as 1882. His connection with the Westinghouse Electric & Mfg. Company began in the year 1889, when he was made the manager of the Philadelphia office, which position he filled successfully up to the time of his death. Mr. Bragg had a most genial disposition, which endeared him to all with whom he came in contact. He was born and reared in Franklin County, Mo. Following his early education, he attended Yale College, from which he was graduated. He was 56 years old. Mr. Bragg is survived by his wife and one daughter.

Grand Trunk Trains All to the Right.

On Sunday, August 22, at 9 a. m., the Grand Trunk Railway changed its plan of running trains from right-hand to left-hand throughout the double track divisions (all east of Detroit and Sarnia) where left-hand running has heretofore been the fashion. In a notice given to the newspapers the principal reason given for

the change is that, as the engineman is in the right-hand side of the engine cab, and as semaphores and other signals ought to be outside of the two tracks, it will facilitate the observance of the signals to run on the right-hand track. A number of other railroads run trains short distances over the Grand Trunk, and by this change the practice of the Grand Trunk lines will be made uniform with that of the other lines referred to. Cross-over tracks have been changed so as to make the switches trailing. For a short time following the change enginemen were instructed to continue to be guided by the existing signals when approaching stations—mostly station semaphore signals—without regard to whether the signal had or had not been changed to a new position. Placards, printed in large type, were posted at the stations and at other places to warn the public of the change.

New York Municipal Ferry.

Deckhands on the municipal ferryboats are about to demand an increase from $60 and $75 a month, now paid them, to $75 and $90 a month. There is now in the employ of the Dock Department twice the force at from 25 to 50 per cent. per capita higher pay than is used by any of the great railway corporations operating ferries here.

A complete crew is kept idle on the payrolls for the tied up boat (four out of five are in use), which is usually in dry dock undergoing repairs or being painted. Therefore the city is paying for a triple crew (one for each eight hours of the day) for the laid up boat every day in the year. The system was inaugurated by the former Commissioner and has been continued by the administration under pressure from the political powers, who have found in the municipal ferry a patronage bonanza.

While each boat is provided with three complete crews, fifteen in all, there are extra men besides. There are 15 pilot quartermasters, 33 engineers, 31 oilers, 56 stokers, 75 deck hands and 30 water tenders.

Following is a list of the employees in the Bureau of Ferries:

Superintendent	$4,000 a year
Assistant superintendent	$2,500 a year
Mechanical engineer	$4,000 a year
Mechanical engineer (naval)	$1,800 a year
Clerks	3 at $1,500 to $2,100 a year
Junior clerks	5 at $50 a month
Stenographers and typewriters	2 at $1,000 to $1,500 a year
Collectors	$1,800 a year
Messenger	$1,200 a year
Attendants	35 at $50 to $55 a month
Financial clerks	23 at $60 to $80 a month
Captains	16 at $1,920 a year
Pilot quartermasters	15 at $100 a month
Engineers, Chief	15 at $1,800 a year
Engineers, assistant	18 at $1,650 a year
Oilers	31 at $90 a month
Stokers	56 at $90 a month
Deck hands	75 at $60 to $75 a month
Water tenders	30 at $100 a month
Ship carpenters	6 at 50 cents an hour

On the Pennsylvania, Central of New Jersey, West Shore, Erie, Lackawanna and other ferries half of the men start at work noon Monday, and work until 9 at night. By 10 the boat is cleaned and the men ready to turn in. They sleep until 7 Tuesday morning, when they go on duty, and at noon are off for twenty-four hours, or until noon Wednesday. In this way a man works ten hours one day and five hours next. He has an entire day of twenty-four hours to himself at the end of each forty-eight hours. The following comparison tells its own story:

Positions.	Municipality.	Railroads.
Captains	$160.00 a month.	$135.00 a month.
Quartermasters	100.00 "	55.00 "
Engineers	150.00 "	120.00 "
Assistant engineers	137.50 "	None employed.
Oilers	90.00 "	65.00 a month.
Water tenders	100.00 "	None employed.
Stokers	90.00 "	62.50 a month.
Deck hands	60 to 70 "	50.00 "
Ship carpenters	.50 an hour.	None employed.

A municipal boat has an engineer and an assistant, two oilers, three or four stokers, five deck hands, two water tenders and a ship carpenter; whereas a Pennsylvania or Central of New Jersey boat carries one engineer, one oiler, three deck hands, two stokers, no water tenders and no carpenters.—*New York Herald.*

Railroad Subsidies in Canada.

The railroad subsidies brought forward by the Minister of Railroads for the consideration of Parliament call for payments of $3,200 a mile up to a cost of $15,000 a mile for construction, and above that sum 50 per cent. of the cost of construction up to a maximum of $6,400 a mile. There are 43 lines to be subsidized. They cover a length of 2,885 miles, and on the basis of the minimum subsidy of $3,200 a mile represent a total of $9,320,000, including a lump subsidy to the projected Brockville, Westport & Sault Ste. Marie Railroad.—*Consular Report.*

Locomotive for Pennsylvania State College.

The Pennsylvania Railroad has sent to the Mechanical Engineering Department of the Pennsylvania State College one of its D-8 passenger locomotives to be used for experimental and instruction purposes. It goes to the college direct from the repair and paint shops, with necessary taps and connections for complete testing. During the coming school year it will be used principally for road testing on the Bellefonte Central Railroad and for certain special experimental work. During the past two years many test runs have been made on one of the engines of the Bellefonte Central under the direction of Prof. A. J. Wood, and this work will be considerably extended the coming year with the increased facilities. All mechanical engineering students are required to take some work in railway mechanical engineering, and those who so desire may in their senior year elect special studies in the advanced theoretical and applied work along this line. The leading dimensions of the locomotive are as follows:

Driving wheels: No.	4; diameter 62 in.
Total engine wheelbase	23 ft. 5½ "
Size of cylinders	17 x 24 "
Type of boiler	Wagon top, crown bars
Total heating surface	1,392 sq. ft.
Steam pressure	130 lbs.
Total weight of engine	91,300 lbs.
Total weight of tender, loaded	60,000 lbs.
Fire grate area	17.6 sq. ft.
Tractive power (with M. E. P. = ⅘ boiler press.)	11,640

Retirement of the General Manager of the Midland Railway.

A striking personality has been lost to British railroad personnel by the retirement, on grounds of ill-health, of Mr. John Mathieson, who has been general manager of the Midland Railway of England for the past five years. Without influential friends, he rose from the lowest rung in the ladder to nearly the highest. His commanding personality and bluff manners made him deservedly popular all through his railroad career.

John Mathieson.

He was born at New Cumnock, Ayrshire, and began his railroad service at the age of thirteen as a clerk to the Glasgow & South Western in the station of his native village. About seven years later he was appointed stationmaster at Stewarton, whence after four years he was transferred to Glasgow. There he was after a brief period appointed assistant to the superintendent of the line, and on the death of his chief was appointed to succeed him, being at the time only 29 years old. The conspicuous ability which he displayed in this position led to his being offered and accepting, in 1889, the post of Chief Commissioner of the Queensland Railways, Australia, at a salary of $15,000. There, in spite of jealousy and dissension, his administration gave such good results that seven years later he was called to undertake the still more responsible duties of Commissioner of the Victorian Railways, Australia, at a salary of $17,500. At that time the Victorian Railways were in a deplorable state in consequence of the political control exercised over every department. One of the first things that the new Commissioner did was to make a tour of inspection of the system, and he found that there were no less than 32 lines, aggregating 509 miles, which did not pay working expenses. His influence soon began to make itself felt, and his judicious economies coupled with tactfully granted facilities brought the railroads into a valuable property for the colony. A man of ideas, he had the strength to carry them out, and in so doing won both respect and affection.

In 1901 the directors of the Midland Railway of England wanted a new general manager and selected Mr. Mathieson. His successor in Victoria is Mr. Thomas Tait, previously Manager of Transportation of the Canadian Pacific. Mr. Mathieson's work in England did not, of course, afford him the same opportunities for improvement as he had in Australasia, but under his management the Midland has continued, both with travelers and traders, to be the most popular of the English roads. During his five years' management the Midland has started its own steamship services between England and Ireland and bought up a large Irish railroad.

Commerce Through the Soo Canals.

The amounts of both eastbound and westbound freight through the canals at Sault Ste. Marie, Mich., and Ontario, Canada, during July of this year, show large increases over the figures for July, 1905. The net tonnage eastbound was 6,273,734, an increase of 778,856, the most noticeable increase being in grain, there being 4,936,511 bushels of wheat carried, an increase of 2,235,346 bushels, and 4,736,253 bushels of grain other than wheat, an increase of 3,185,002 bushels. The net tonnage of the westbound freight was 1,459,037, an increase of 250,155 tons. The shipments of hard coal in this direction decreased about 9 per cent., while the soft coal carried increased about 20 per cent.; other important increases were in manufactured iron and general merchandise. The number

of vessels passing through the canals was 3,365 as compared with 3,181 during the same period last year.

Renumbering Pennsylvania Railroad Freight Cars.

For a task combining multiplicity of details with simplicity of plan the renumbering of the cars of the Pennsylvania Railroad System (East and West) is probably as shining an example as could be found. The numbers are classified so as to run as high as 999,999. Nearly 100,000 of the freight cars east of Pittsburg have already been changed, and an officer gives us the following note of the progress of the work:

"Nearly 100,000 cars on the lines east have been renumbered, and probably more than half the equipment on lines west of Pittsburg. The Pennsylvania Railroad Lines East of Pittsburg take the numbers from 10,001 to 500,000 and the lines west of Pittsburg from 500,001 to 999,999. The numbers below 10,000 are reserved for passenger equipment, and when all cars have been renumbered there will be no duplicate numbers of any ownership or sub-ownership either east or west of Pittsburg.

"In renumbering, all cars of the same dimensions, capacity and kind are grouped together, so that when the work is completed, if the kind, size or capacity be needed it can be found in the *Official Railway Equipment Register* without having to inquire of the owners for the information or to examine the car. The new numbers, arranged in groups, are already shown in the *Equipment Register*. At present we are renumbering all cars above 100,501; the numbers from 10,001 to 100,501 being reserved for box cars. As soon as we get all of these other kinds of cars out of the series between 1 and 100,500 we shall renumber and reclassify the box cars.

"The cars on the lines east of Pittsburg and Erie when painted and renumbered will bear the word "Pennsylvania" over the car number on the side, and "P. R. R." over the car number on the ends; but if the renumbering is done before the car is repainted, it will bear the present ownership initials until such time as it goes to the paint shop. In the same way the cars on the lines west of Pittsburg will be repainted and renumbered, "Pennsylvania Lines" above the car numbers on the sides and "P. L." above the car number on the ends; but if renumbered before repainted they will temporarily bear the present ownership initials."

TRADE CATALOGUES.

Street Cars.—An order guide for supplies and car and truck specialties (No. 165) has just been issued by the J. G. Brill Co., of Philadelphia; the G. C. Kuhlman Car Co., of Cleveland; the American Car Co., of St. Louis, and the John Stephenson Co., of Elizabeth, N. J., the four companies which are associated in the manufacture of cars and car equipment for street and electric railways. This guide is a 12½ in. x 10 in. pamphlet, with illustrations of the various parts of the cars, made clear by reference numbers to an index for each photograph. It also includes information about special types of cars, such as the Brill grooveless-post semi-convertible car, the "Narragansett" car, the centrifugal sprinkling car, and standard snow sweeper and snow plow. These types cover the general division of the pamphlet on special types of cars. The other three parts into which the book is divided are: Trucks, Relating to Trucks, and Car Specialties and Appliances.

Insulation for Pipes.—A small illustrated pamphlet issued by the H. W. Johns-Manville Co., New York, contains a brief description of its Portland conduit system for the protection and insulation of steam, gas and water pipes. The conduit used in this system is furnished in 3-ft. lengths and is divided longitudinally into two sections, forming the top and bottom halves of the conduit. Asbestos-sponge conduit filling is used for insulation. A brief summary of a test on an installation of this system at the Phillips Academy, Andover, Mass., is given.

Electric Car Lighting.—Bulletin 3 of the Bliss Electric Car Lighting Co., Milwaukee, Wis., describes this company's system for electrically lighting railroad cars. Every part of the equipment is described, and illustrated in detail with half-tone engravings. Wiring diagrams also are given. The pamphlet, which is 8 x 10½, has 23 pages and is printed in two colors, presenting a neat and attractive appearance.

Steam Shovel News.—The July number of this magazine contains articles on "Iron Mining on a Big Scale," "A Rival for Panama," "Lake Erie and Ohio Canal," and "Comparison of Western Irrigation Resources and the New Croton Dam." Also illustrations and miscellaneous matter of interest in connection with steam shovels and their work.

Manufacturing and Business.

One of the orders recently booked by the Allis-Chalmers Company is for one 32-in. and 68-in. by 60-in. Reynolds heavy duty cross compound condensing Corliss engine for the Cleveland Electric Railway.

The Electric Storage Battery Company, of Philadelphia, announces that the number of chloride accumulator and other batteries made by that company now in use in connection with railroad signals, mainly automatic block signals, aggregates 58,000 cells. Forty per cent. of this quantity has been put into service within the past seven months.

The firm of Mansfield Merriman and C. W. Hudson, Consulting Engineers, will begin business on September 1 at 45 Broadway, New York. They will specialize on bridges and steel buildings and on the hydraulics of water power and water supply. Professor Merriman is Professor of Civil Engineering in Lehigh University and has been granted a leave of absence for one year. Mr. Hudson is Assistant Engineer of the Phoenix Bridge Co. and has resigned from that position, effective on the above date.

Iron and Steel.

The Seaboard Air Line has ordered 25,000 tons of rails and the Southern Railway 5,000 tons.

The Western Pacific has ordered 5,500 tons of bridge steel. This order is reported to have been given to the Pennsylvania Steel Company.

The total exports of iron and steel from the United States during June amounted in value to $14,085,003 as compared with $11,821,097 for the same period in 1905. For the year ending June 30, the value of the exports of iron and steel was $160,984,985 as compared with $134,728,363 in 1905.

The Pennsylvania has given a supplementary order for 3,500 tons of rails for 1907 delivery, and also orders for bridge material aggregating 900 tons of structural steel. According to western reports, the American Shipbuilding Co. now has contracts for 19 large steamers, aggregating an amount of $8,000,000.

OBITUARY NOTICES.

Elmer Church Smith, Assistant Engineer of the Colon division of the Panama Canal, died recently at the Isthmus.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Alaska Central.—F. A. Heinze, of Butte, Mont., has been elected a Director.

Central of Georgia.—W. C. Askew has been appointed Assistant Treasurer, with office at Savannah, Ga.

Dublin & Southwestern.—See Wrightsville & Tennille.

Indianapolis Southern.—This company operates a line from Indianapolis, Ind., to Bloomington, and the line from Effingham, Ill., to Switz City, Ind., formerly operated by the Illinois Central. J. C. Welling, Vice-President of the Illinois Central, is President of the Indianapolis Southern.

Live Oak, Perry & Gulf.—J. H. Powell has been elected Treasurer, with office at Jacksonville, Fla., succeeding F. M. Bowling.

Mississippi Central.—G. F. Royce is Comptroller, with office at Scranton, Pa.

Montana.—T. A. Mapes has been appointed Secretary, with office at Helena, Mont., succeeding F. W. Sharpe, who remains Treasurer and Auditor.

Pennsylvania.—S. B. Lloyd has been appointed Assistant General Solicitor of this company, the Philadelphia, Baltimore & Washington, the West Jersey & Seashore and of the Northern Central, there being now three Assistant General Solicitors instead of two as formerly.

Stillmore Air Line.—See Wadley Southern.

Wadley & Mt. Vernon.—See Wadley Southern.

Wadley Southern.—This company is a consolidation of the Wadley & Mt. Vernon and the Stillmore Air Line. The officers are: H. P. Smart, President; W. A. Winburn, Vice-President; W. A. Beymer, Auditor; T. N. Cunningham, Treasurer, and T. Wells, Car Accountant, all with offices at Savannah, Ga., and P. Holloman, General Superintendent, with office at Wadley, Ga.

Wrightsville & Tennille.—Otis Ellison, Treasurer, has been appointed Auditor, succeeding D. R. Thomas, appointed Superintendent. Mr. Thomas retains his position as Secretary. P. C. Thomas, Jr., has been appointed Acting Treasurer, succeeding Mr. Ellison.

Operating Officers.

Augusta Southern.—James Andrew White, who was lately appointed Superintendent of the Augusta Southern, with headquarters at Augusta, Ga., was born on Feb. 16, 1858, at Petersburg, Va. He was educated at the University of Virginia and entered railroad service on Jan. 1, 1882, as Superintendent of the Oxford & Henderson Railroad, now part of the Southern Railway. This position he held for five years until Oct. 1, 1887, when the Oxford & Henderson was leased to the Richmond & Danville, and he was appointed Agent of the Richmond & Danville at Oxford, N. C. After this he was Agent of the Richmond & Danville and its successor, the Southern, at a number of different places, and on Nov. 1, 1900, was appointed Superintendent of the Danville & Western. In 1903, he became Assistant Superintendent of the Washington division of the Southern, which he held until his recent appointment.

Chesapeake Western.—M. L. Mardis, General Manager and Traffic Manager, has resigned. The duties of General Manager are now performed by the President, and C. A. Jewett, General Freight and Passenger Agent, has been appointed Traffic Manager.

Coal & Coke.—Edwin Bower has been appointed to the new office of Assistant General Manager.

Dublin & Southwestern.—See Wrightsville & Tennille.

Fort Worth & Denver City.—H. A. Gausewitz, Assistant Superintendent of the Colorado & Southern at Trinidad, Colo., has been appointed Superintendent of the Ft. W. & D. C., with office at Childress, Tex., succeeding W. W. Millar, resigned.

Louisiana & Arkansas.—F. W. Green, Superintendent of the Memphis division of the St. Louis, Iron Mountain & Southern, has been appointed General Superintendent of the L. & A., with office at Stamps, Ark., succeeding J. H. White, resigned.

Midland Valley.—The offices of the General Superintendent and of the Car Accountant have been moved from Fort Smith, Ark., to Muskogee, Ind. T.

Missouri Pacific.—C. E. Carson, formerly Superintendent of the Colorado & Southern at Denver, Colo., has been appointed Superintendent of the Kansas City terminals of the Missouri Pacific and the St. Louis, Iron Mountain & Southern, succeeding E. K. Carnes, resigned.

St. Louis, Iron Mountain & Southern.—H. L. Hungerford, Superintendent of Terminals at Little Rock, Ark., has been appointed Superintendent at Wynne, Ark., succeeding F. W. Green, resigned. W. T. Caldwell succeeds Mr. Hungerford. See Louisiana & Arkansas.

See Missouri Pacific.

Southern.—J. Lasseter, Trainmaster at Tuscumbia, Ala., has been appointed Assistant Superintendent at Birmingham, Ala., succeeding C. L. Harris, promoted. F. B. Pelter has been appointed Assistant Superintendent at Columbus, Miss., succeeding J. W. Web.

Vera Cruz & Pacific.—John Mas has been appointed Car Accountant, with office at Vera Cruz, Mex., succeeding F. Morgan. J. B. Melville has been appointed Superintendent, with office at Tierra Blanca, Mex., succeeding C. D. Taylor.

Wrightsville & Tennille.—D. R. Thomas, Auditor, has been appointed Superintendent, succeeding T. T. Hollomón, resigned to go to the Wadley Southern. Mr. Thomas continues to be Secretary of the company.

Traffic Officers.

Central Railroad of New Jersey.—W. C. Hope, Assistant General Passenger Agent, is to be appointed General Passenger Agent on September 1st, succeeding C. M. Burt, who on that date resigns to go to the Boston & Maine as General Passenger Agent.

Chesapeake Western.—See Chesapeake Western under Operating Officers.

Coeur d'Alene & Spokane.—W. G. Paine, Traffic Manager, has been appointed General Passenger Agent and J. H. Lothrop has been appointed General Freight Agent, both with offices at Spokane, Wash.

Columbia Southern.—See Oregon Railroad & Navigation.

Ilwaco Railway & Navigation Company.—See Oregon Railroad & Navigation.

Oregon Railroad & Navigation.—William McMurray, Assistant General Passenger Agent at Portland, Ore., has been appointed General Passenger Agent of this company, of the Southern Pacific lines in Oregon, of the Columbia Southern and of the Ilwaco Railway & Navigation Co., succeeding A. L. Craig, resigned to go to the Great Northern. J. M. Scott succeeds Mr. McMurray.

St. Louis Southwestern.—J. B. Watson has been appointed Assistant General Freight Agent, with office at St. Louis, Mo., succeeding T. C. Frew, resigned.

Seaboard Air Line.—P. B. Thompson, who was recently appointed Assistant Freight Agent, with headquarters at Savannah, Ga., began his railroad service with the Merchants' & Miners' Transportation Company. He was, from 1900 to 1902, later joint Agent for ten associated railroads of Virginia and the Carolinas at Norfolk, Va., and the latter year went to Baltimore as Agent of the Seaboard Air Line. Later he was appointed General Agent of the company at Baltimore, representing the Seaboard Air Line Railroad, the Seaboard Savannah Line, the Seaboard Despatch and the Air Line Despatch fast freight lines, from which post he was promoted to his present position.

Southern Pacific.—See Oregon Railroad & Navigation.

Engineering and Rolling Stock Officers.

International & Great Northern.—C. M. McLain, Master Mechanic at Taylor, Tex., has resigned. Mr. McLain is succeeded by B. P. Meyers.

Isthmian Canal Commission.—Joseph Ripley, formerly General Superintendent of the Sault Ste. Marie Canal and one of the assistant engineers in its construction, has been appointed Principal Assistant Engineer.

Lake Shore & Michigan Southern.—LeGrand Parish, recently promoted from Assistant Superintendent of Motive Power of the L. S. & M. S. to be Superintendent of Motive Power of the Michigan Central, has been transferred to the same position on the Lake Shore & Michigan Southern. See Michigan Central.

Michigan Central.—E. D. Bronner, recently appointed Superintendent of Motive Power of the Lake Shore & Michigan Southern, has gone back to his former position (with the same title) on the Michigan Central. The change is made at his own request. See Lake Shore & Michigan Southern.

Midland Valley.—The office of the Master Mechanic has been moved from Fort Smith, Ark., to Muskogee, Ind. T.

Pennsylvania Lines West.—W. C. A. Henry, who has been Master Mechanic of the Columbus shops, has been appointed to the new office of Assistant Superintendent of Motive Power, with office at Columbus, Ohio.

N. M. Loney, Assistant Engineer of Motive Power of the Northwest System, at Fort Wayne, Ind., has been appointed Master Mechanic of the Northwest System, with headquarters at Chicago, succeeding Joseph J. Walsh, transferred.

Purchasing Agents.

Birmingham Southern.—W. A. Major has been appointed Purchasing Agent.

LOCOMOTIVE BUILDING.

The Chicago, Lake Shore & Eastern, it is reported, will soon be in the market for locomotives.

The Tidewater, as reported in our issue of August 3d, denies being in the market for locomotives.

The Lehigh & New England, it is reported, has ordered five large freight locomotives from the Baldwin Works.

The Charlotte Harbor & Northern is asking prices on five locomotives, two for passenger and three for freight service.

CAR BUILDING.

The Chicago, Milwaukee & St. Paul is in the market for six flat cars.

The Chesapeake & Ohio has ordered 10 passenger cars from the Pullman Co.

The Indiana Union Traction Co. is reported in the market for electric cars.

The Chicago, Lake Shore & Eastern is reported in the market for 1,950 coal cars.

The New York Central & Hudson River has ordered one buffet car from the Pullman Co.

The Western Pacific, it is reported, is in the market for 500 ballast cars and 200 flat cars.

The Lehigh & New England is negotiating for the purchase of several hundred freight cars.

The Nashville, Chattanooga & St. Louis, it is reported, will build 500 coal cars at its own shops.

The Grand Trunk Pacific directors, it is reported, have decided to spend $15,000,000 on rolling stock.

The Canadian Pacific, it is reported, will build two additional steam motor cars in its Angus shops.

The Buffalo, Lockport & Rochester (Buffalo) is in the market for 17 electric cars. C. B. Hill is President.

The Cumberland Railway & Coal Co. is reported in the market for 250 gondola cars of 100,000 lbs. capacity.

The Union Railroad of Pittsburg is reported to have ordered 500 steel ore cars from the Pressed Steel Car Co.

The Wabash, it is reported, is asking prices on 4,000 cars of 100,000 lbs. capacity and 2,000 cars of 80,000 lbs. capacity.

The Tonopah & Goldfield has ordered one passenger car, one express and mail car and one baggage car from the Pullman Co.

The Northern Pacific is in the market for from 3,000 to 5,000 box cars, and will probably ask bids for 500 stock and 500 gondolas.

The Harriman Lines are in the market for 4,000 box cars, 1,400 flat cars, 1,000 refrigerator cars, 875 oil tank cars, 600 hopper cars, 500 gondola cars and 500 stock cars.

The Illinois Central has ordered 20 passenger coaches, 5 chair cars, 2 mail cars, 10 baggage cars and 8 combination mail and baggage cars from the Pullman Co.

The Charlotte Harbor & Northern is in the market for 30 drop bottom gondola cars, 20 ventilated box cars, four coaches and two combination passenger and baggage cars.

The Chicago, Rock Island & Pacific, it is reported, has reserved space with the American Car & Foundry Co. for 5,000 box cars and is asking bids on 5,000 additional box cars.

The Chicago & North-Western has ordered 700 box cars of 80,000 lbs. capacity, 500 flat cars of 80,000 lbs. capacity, 300 gondola cars of 80,000 lbs. capacity, 600 stock cars of 60,000 lbs. capacity, 25 cabooses, 20 vestibule coaches, ten 60-ft. baggage cars, 10 combination passenger and baggage cars, 4 dining cars, 3 standard parlor cars, 3 observation parlor cars and 10 chair cars from the Pullman Co., and 1,000 box cars of 80,000 lbs. capacity and 400 ore cars from Haskell & Barker. The dimensions and specifications are Chicago & North-Western standard, the same as the last ordered. (Nov. 17, 1905, p. 158.)

The Nashville, Chattanooga & St. Louis is building 500 gondola cars of 80,000 lbs. capacity at its Nashville shops. The dimensions and special equipment are as follows: Weight, 35,000 lbs.; length over all, 36 ft. 9 in.; width over all, 9 ft. 9 in.; height over all, 8 ft. 3 in.; Commonwealth Steel Co.'s bolsters, Simplex Railway Appliance Co.'s brake-beams, Westinghouse brakes, N., C. & St. L. brasses, Tower couplers, N., C. & St. L. doors, Thornburgh draft rigging, N., C. & St. L. dust guards and journal boxes, Railway Steel Spring Co.'s springs, N., C. & St. L. trucks, and Louisville Car Wheel Co.'s wheels.

RAILROAD STRUCTURES.

ABERDEEN, S. DAK.—The Minneapolis & St. Louis is ready to let contracts for putting up about 25 station buildings at the new towns on the extension from Watertown to Leola, and Conde to the Missouri river. George Cooke has charge of this work. At Conde, Leola and Scranton the stations are to be larger than the rest, and roundhouses and freight houses will also be put up. The station at Aberdeen is to be larger than at any place on the road; plans are being made for a model building and several freight sheds.

AKRON, OHIO.—The County Commissioners and the Northern Ohio Traction Co. have decided to jointly build a new bridge at Alexanders.

BRANDON, MAN.—The Brandon, Saskatchewan & Hudson Bay line of the Great Northern is to put up a large passenger station here.

CHARLESTON, W. VA.—The Chesapeake & Ohio has given a contract to A. M. Walkup, Richmond, Va., for a $15,000 brick freight station.

DENVER, COLO.—Work has been begun by the Colorado & Southern on a new freight station to cost about $50,000, and to be used for inward freight. The old house will be devoted to outbound freight.

ENGLEWOOD, KAN.—It is reported that the Atchison, Topeka & Santa Fe has decided to build a new passenger station at this place.

HENDERSON, KY.—It is said that the Illinois Central will build its own bridge over the Ohio at Incline, three miles above this place.

JACKSON, TENN.—An appropriation of $1,000,000 has been made by the Mobile & Ohio for new second main track and for a new freight yard near Jackson 250 ft. wide and one mile long.

LITTLE ROCK, ARK.—The St. Louis, Iron Mountain & Southern will accept the terms of the ordinance recently passed granting certain streets of this company as approaches to a new union station. Work on the structure is to be started early in September. The cost of the improvements will be about $400,000.

MOUNT CARMEL, PA.—Bids are being asked for building a new wooden passenger station for the Lehigh Valley at this place.

MUSKEGON, MICH.—Plans are being made for putting up a new passenger station here for the Grand Trunk, to cost $20,000.

NORFOLK, VA.—Raymond Dupuy, General Manager of the Tidewater Railroad, is quoted as saying that the company will not build its shops and roundhouses at Salem in Roanoke County, but has selected a site in Lunenburg County, 165 miles from Norfolk.

OKLAHOMA CITY, OKLA.—Work is to be started early next year on the union passenger station for the St. Louis & San Francisco and the Chicago, Rock Island & Pacific. It will cost about $300,000.

PHILADELPHIA, PA.—The Philadelphia Rapid Transit Co. has given contracts to F. T. McGuire for building eight stations along the line of the Market street elevated road. The American Bridge Co. has the contract for furnishing the steel for the structural work. Work is to be started at once.

SAN ANGELO, TEX.—A contract is reported let by the Santa Fe for putting up a new passenger station here, to cost $25,000.

SASKATCHEWAN, SASK.—Local reports state that the Canadian Pacific has bought a large plot of ground for a station.

SHREVEPORT, LA.—It is stated that the Kansas City Southern shops at this place are to be enlarged and 14 acres of land to be added to the yards, the cost of the improvements being about $150,000.

SPOKANE, WASH.—Contracts have been given by the Oregon Railroad & Navigation Co., to McCreary & Williard, of this place, for putting up steel bridges at a total cost of about $250,000. There is to be a steel bridge over Hood river 710 ft. long; over Sandy river, near Troutfale, a bridge 420 ft. long; over Umatilla river at Umatilla, and another 300 ft. long over the same river at Pendleton. There will also be short bridges over the Deschutes, the Walla Walla and Burnt rivers.

WASHINGTON, D. C.—The Baltimore & Ohio has awarded the contract for building two roundhouses, each having room for 25 locomotives, two turntable pits, machine shop, power house, oil and store house, ash pit, inspection pit, signal towers and other buildings, in connection with the Union Terminal work at Washington, D. C., to the Wells Brothers Company, of New York and Baltimore. The same contractors are just completing the new thirteen-story general office building of the railroad company at the northwest corner of Baltimore and Charles streets, Baltimore.

WAYNESBORO, VA.—Contracts have been given to A. M. Walkup, Richmond, Va., by the Chesapeake & Ohio for a brick passenger station at this place, to cost about $20,000.

WINCHESTER, KY.—The Chesapeake & Ohio and the Louisville & Nashville have given the contract to A. M. Walkup, Richmond, Va., for a freight station at this place, to cost $18,000, and to be finished about October 20.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ARGENTINE CENTRAL.—This road, which runs from Silver Plume, Col., to an elevation of 14,000 ft. at the summit of Mt. McClellan, was on August 1 opened to traffic. (May 18, p. 149.)

ARKANSAS, RED RIVER & PARIS.—Incorporated in Arkansas to build a line from Morris' Ferry on the Kansas City Southern east to a point near Harris' Ferry on the Red river, approximating 38 miles. The incorporators include: T. S. Brown, W. S. Pryor, of Kansas City; F. A. Locke, W. C. Martin and W. E. Kinsworthy, of Ashdown.

ATLANTA, BIRMINGHAM & ATLANTIC.—A contract is reported let to C. D. Smith & Co. to build this line from Talladega to Pelham, Ala., which is 19 miles from Birmingham. The line will enter Birmingham through Reader's Gap and the city of Bessemer. The route from Reader's to Pelham has not yet been decided upon. The sections between Montezuma and LaGrange, Ga., and between LaGrange and Roanoke, Ala., are practically completed.

BUFFALO CREEK EXTENSION.—This company has been incorporated in New York State to build a road, eight miles long, from the Buffalo Creek Railroad in Buffalo to a point connecting with the Terminal Railway of Buffalo at Gardenville, Erie County, with a branch connecting with the Lehigh Valley in Buffalo. The capital stock is $400,000. The directors include F. D. Underwood and George F. Brownell, President and Vice-President, respectively, of the Erie.

CANADIAN PACIFIC.—A new branch of the Ontario division, called the Elmira branch, has been opened for business, extending from Guelph, Ont., to Elmira, Ont., 16 miles.

Surveys, it is said, are being made by this company for a branch line from the end of the Lacombe section to Hanley, Sask., on the Prince Albert branch.

On the Toronto-Sudbury branch of this company, which starts from the Owen Sound branch at Bolton, a length of 70 miles has been finished, and it is expected that the whole branch will be in operation early next spring.

Surveys are being made by this company for a line from London, Ont., to the St. Clair river at Corunna via Strathroy and Petrolea.

Cardenas Railroad & Terminal.—Incorporated in New Jersey with $1,000,000 capital to build a line from Cardenas, Cuba, west to the Peninsula of Hicacos, thence along the peninsula to Puenta Gorda, passing through El Veradero. The office of the company will be at Cardenas. The incorporators are: John S. Fiske, Dewitt Bailey and Paul R. E. Steier, 15 Exchange place, Jersey City, N. J.

Cherryvale, Oklahoma & Texas.—Local reports state that W. R. Stubbs, of Lawrence, and Senator Sam Porter, of Caney, have completed the financing for this proposed road, which is to be 320 miles long. The proposed route is from Cherryvale, Kan., on the A., T. & S. F. and the St. L. & San Francisco, southwest to Geary, Okla., on the Rock Island. The work will cost about $4,000,000. A charter which was granted in Oklahoma describes a line 900 miles long. It is the intention of the promoters eventually to extend the line to El Paso. (May 4, p. 136.)

Chesapeake & Nashville.—The Chesapeake & Nashville Railway, which runs from Gallatin, Tenn., on the Louisville & Nashville via Hartsville Junction and Westmoreland to Scottsville, Ky., 35 miles, with a branch from Hartsville Junction to Hartsville, 12 miles, has been acquired and is now operated by the Louisville & Nashville.

Chicago & North-Western.—On July 29 the new line between Manitowoc, Wis., and Fox river, 34.7 miles, was opened for traffic.

The Loano branch of the Ashland division has been extended from Long Lake, Wis., to Saunders, 14 miles.

Chicago, Burlington & Quincy.—The Lincoln division has been extended northward to Sioux City, Iowa, 33 miles. This official notice indicates that the new connection with the Great Northern will be operated by the Burlington. (See Great Northern, June 15, page 175.)

Chicago, Cincinnati & Louisville.—Press despatches from Muncie, Ind., state that this company is surveying an extension from Griffith, Ind., to Chicago, Ill., 29 miles. At present the C., C. & L. uses the Grand Trunk tracks between these points.

Chicago, Lake Shore & South Bend (Electric).—Surveys and estimates have been completed by J. G. White & Co., of New York, for building this proposed electric line from South Bend, Ind., west to the Illinois-Indiana state line in Hammond, approximately 70 miles. It is said that the road is to be financed by the Transit Finance Co., of New York, and the promoters hope to make a connection with the Illinois Central so as to reach Chicago. From Hammond, east, the line will run through the new United States Steel Corporation Works at Gary, thence via Dune Park, Michigan City and New Carlisle to South Bend. (See Construction Record.)

Chicago, Milwaukee & St. Paul.—A new branch has been opened for business on the Southern Minnesota division extending from Madison, Wis., to Colton, 19 miles.

Chicago, New Washington & Bucyrus (Electric).—This company proposes to build an electric line from Chicago, Ohio, through New Washington to Bucyrus, to connect with the Ohio Central Traction lines. E. L. Williams, of Chicago, is President, and R. B. Seers, of Bucyrus, Secretary and Treasurer.

Chicago, St. Paul, Minneapolis & Omaha.—The Radisson line of the Wisconsin division has been extended from Winter, Wis., to Draper, 10 miles.

Cleveland, Cincinnati, Chicago & St. Louis.—Local reports state that preliminary surveys have been made by this company for building a cut-off about one mile long to connect the Chicago division with the new Chicago, Indiana & Southern at Sheff, Ind.

Contracts have been let to W. F. Nugent & Bros., Louisville, Ky., for 10 miles of double-tracking on the line from Indianapolis, Ind., to Greencastle. Work has already begun.

Colorado & Southern.—It is reported that this company is making surveys with a view to extending its Catskill branch 50 miles westward from the present terminus at Martensen, Colo. The extension is to reach an extensive pine lumber land. Parts of the existing branch will be rebuilt.

Eldorado, Marion & Southwestern.—An officer writes that work has been started on this proposed line. The company was recently incorporated in Illinois to build from Eldorado through Marion, west to a point on the Mississippi river. A contract has been let for the grading east of Marion to Charles E. Larue. The work is not difficult, maximum grades being $^{7}/_{10}$ per cent. and the curvature 4 deg., with some light bridge work. S. T. Brush, of Carbondale, is President; S. H. Bundy, Carterville, Treasurer, and F. Hutchinson, Chief Engineer. (July 20, p. 18.)

Fording Valley.—This Canadian railroad company is reported to have just started building 100 miles of road in Alberta and British Columbia. Some time ago it obtained federal and local charters for a line from Michel on the Crow's Nest Pass section of the Canadian Pacific to a point on the main line of the Canadian Pacific east of Calgary. The first section to be built by the company, of which W. Herbert Evans, of Montreal, is President, will be from Michel northward 30 miles to the property of the Imperial Coal & Coke Company, where extensive development work has already begun.

Gulf, Colorado & Santa Fe.—On August 1st the Gulf, Colorado & Santa Fe, having leased the Jasper & Eastern, began to operate that part of the line extending from Kirbyville, Tex., to De Ridder, La., 39.6 miles.

Houston & Texas Central.—A new line, called the Navasota-Mexia cut-off, has been opened for business, extending from Mexia, Tex., southward to Jewett.

Illinois Central.—The line from Effingham, Ill., to Switz City, Ind., formerly operated by this company, is now operated as part of the Indianapolis Southern.

Indianapolis, New Castle & Toledo (Electric).—This road is to be built by the Electrical Installation Company of Chicago. Its main line will be from Indianapolis to New Castle, Ind., with branch lines as follows: Indianapolis to New Castle, 45 miles; Maxwell to Greenfield, five miles; Shirley to Anderson, 16 miles; New Castle to Muncie, 20 miles; New Castle to Winchester, 28 miles; New Castle to Richmond, 26 miles; total, 140 miles. The road will serve as the only means of railroad communication with Indianapolis for a large population. A private right-of-way 50 ft. wide and terminal facilities are controlled by the company in the city of Indianapolis. In addition to the passenger traffic, the company's franchise permits the transportation of freight without any restriction. The engineering features include the building and equipment of a main power station near New Castle, and ten permanent and one portable substations, one sub-station being installed in the main power plant building. The main power station will contain units of 1,000 k.w. each, two Allis-Chalmers steam turbo-generating units being installed for present use to supply 25-cycle alternating current to the line by a system of step-up transformers operating at 33,000 volts. The contract for the entire construction of buildings and roadbed has been let to the Electrical Installation Company. Complete Allis-Chalmers power and electrical equipment will be installed in the main power station and three rotary converter sub-stations, which will be built at once. The equipment for the main power station will, for the present, consist of two 1,000 k.w. Allis-Chalmers turbo-generators to operate at 175 lbs. steam pressure and 50 deg. F. superheat, the electrical ends of these units being wound for 25-cycles, three-phase, 2,300 volts.

Indianapolis Southern.—See Illinois Central.

Jasper & Eastern.—See Gulf, Colorado & Santa Fe.

Jennings & Southwest.—Chartered in Louisiana to build from Lake Arthur, Calcasieu Parish, northwesterly to Jennings and then north of Jennings to a point that will intersect the Colorado Southern, New Orleans & Pacific road now building from De Quincy west to Baton Rouge. The road is capitalized at $1,000,000, and the following will compose the first board of directors: S. L. Cary, Alba Heywood, O. W. Heywood, A. C. Wilkins, S. C. Morse, W. Krielow, E. P. Fox, George Hathaway and E. F. Rouson.

Kansas City, Lawton & Pacific.—This company has been incorporated in Oklahoma, with $40,000,000 capital stock, to build from Kansas City to San Diego, Cal., about 1,600 miles. The proposed line follows the border between Kansas and Missouri, touching Arkansas, to Wewoka, in the Indian Territory, thence through Texas, New Mexico, Arizona and California. The first portion to be built will be from Dustin, Ind. T., to Wewoka, 28 miles air line. The headquarters will be at Lawton. The incorporators are: G. M. Paschal, G. F. H. Barber, G. C. Robertson, W. F. Barber and W. C. Stevens, all of Lawton; A. J. Brown, of Wewoka; C. M. Rawlins and Henry Briggs, of Kansas City; H. W. Scott, of New York, and E. A. Hill, of Muskogee.

Kansas City, Mexico & Orient.—According to an official report made to the Mexican Government, this company has completed and opened for traffic the following lines: West of Chihuahua 200 miles, east of Chihuahua 60 miles and east of Topolobampo 75 miles. Grading is furnished for an additional 25 miles.

An extension of the Third district has been opened from Oakwood, Okla. T., southwestward to Clinton, 36 miles.

An extension of the Chihuahua division has been opened for business from San Sostenes, Mex., eastward to Picachos, Mex., a distance of eight miles.

Kansas City Western (Electric).—This company, which op-

erates an electric line 39 miles long from Ft. Leavenworth to Kansas City, Kan., with trackage rights to Kansas City, Mo., is the successor of the Kansas City-Leavenworth Railroad. It has completed a two mile cut-off at Lansing and three other important cut-offs are nearing completion. These cut-offs will shorten the line by about three miles, and in addition will give easier alinement and grades, making it possible to reduce the running time from Kansas City to Leavenworth by about 30 minutes.

LAFAYETTE & CHICAGO (ELECTRIC).—This company has been incorporated in Indiana to build a traction line from Lafayette, Ind., to Chicago through Rensselaer, Crownpoint and Hammond.

LAS VEGAS & TONOPAH.—This road has been extended from Johnnie, Nev., westward to Rose's Well, 25.5 miles.

LOUISIANA & ARKANSAS.—This road has been extended from Packton, La., southward into Alexandria, La., 37 miles.

LOUISVILLE & EASTERN.—It is announced that grading on the extension of this road from Beard's, Ky., to Lagrange, 10 miles, is nearly completed and that the line will be in operation by September 15. Surveys are being made for a further extension from Lagrange to Frankfort.

LOUISVILLE & NASHVILLE.—This company has acquired and now operates the Chesapeake & Nashville and the Yellow River railroads, which see.

MANISTEE & GRAND RAPIDS.—This road has been extended from Dighton, Mich., eastward to Marion.

MARLBOROUGH RAILROAD.—Incorporated in Michigan with $25,000 capital to build a line from a connection with the Pere Marquette to the village of Marlborough in Lake County. C. B. Parsons, O. B. Taylor, W. S. Duncan, H. H. Parsons and Arthur Stansell, of Detroit, are directors.

MEMPHIS, PARIS & GULF.—A contract for grading two miles from Little Rock, Ark., has been let to J. F. Anders, and work is to be started at once. (See Construction Record.)

MEXICAN CENTRAL.—Material, it is said, is on the ground for building a new line from Guanajuato to Marfil.

A contract has been entered into by this road and the Mexican Government by which a short line will be built from Apulco, the present terminus of a branch of the Mexican Central, north about 130 miles, to Tamos on the San Luis division of the road. This short line will give a more direct connection from the city of Mexico to Tampico on the Gulf of Mexico. Under the contract the Government will pay a subsidy of $6,500 a kilometer, 50 kilometers to be completed by June 30, 1908, and the remainder of the line by July 30, 1909. The construction work will be very heavy, the plans calling for about 40 tunnels. A bridge is to be built over the Panuco river by the Government at a cost of about $1,000,000.

MID-OREGON & EASTERN.—This company has been incorporated in Oregon, with $13,000,000 capital stock, to build a road from Portland southeast through the Cascade Mountains, and then east to a point on Snake river, something over 300 miles. The incorporators are: C. H. Monroe, David Leppert and C. L. Tobias.

MINNEAPOLIS & RAINY RIVER.—Work is said to be under way on the extension of this line from Turtle Lake, Minn., to Big Fork. Turtle Lake is the present terminus of a four-mile branch from Jessie Junction, and Big Fork is at the junction of the Big Fork river and Rainy river. It is proposed to continue the line through the last named place along the south side of the Rainy river to International Falls, 70 miles.

MISSOURI RIVER & GULF.—This company, recently incorporated in Kansas, with $1,000,000 capital, and supposed to be a Harriman project, proposes to build a line from Kansas City south across the eastern end of Kansas, and through Indian Territory to Denison, Tex., with branches to Shreveport, La., and Joplin, Mo. The directors are: E. F. Winey, Kansas City, Mo.; K. L. Browne, A. L. Berger, C. K. Wells, S. N. Prouty, B. R. Lane and W. Freeman, of Kansas City, Kan. (Aug. 3, p. 31.)

MOBILE & OHIO.—An appropriation has been made for double-tracking this road from Jackson, Tenn., to Corinth, Ala.

MUNCIE & PORTLAND TRACTION.—This company is to at once begin work on its extension from Portland, Ind., to Celina, Ohio. It is expected that the line will be in operation by May, 1907.

NEW YORK, AUBURN & LANSING (ELECTRIC).—This company is offering through A. H. Flint & Co., New York City, $1,000,000 5 per cent. gold bonds, due June 1, 1935, but redeemable at 105 and accrued interest after 1915, to secure funds to build its proposed electric line from Auburn, N. Y., south through Fleming, Scipio, Venice, Genoa and Lansing, to Ithaca, 34.6 miles. The line is to be built for high speeds, and the company proposes to make extensive freight connections. A contract has been made with the Niagara, Lockport & Ontario Power Co., for power. The track will be laid with 75-lb. rails. (July 27, p. 25.)

PENNSYLVANIA LINES WEST.—Plans are being considered for a cut-off from Smiths Ferry, Pa., through Columbiana County, Ohio, to a connection with the Pittsburg, Fort Wayne & Chicago just east of Alliance, Ohio, 40 miles air line. The route goes through the townships of St. Clair, Madison, Wayne, Center, Hanover, Butler and Knox.

PRESCOTT & NORTHWESTERN.—The main line having been extended as far as Helbig, Ark., trains are now operated to that point from Prescott, Ark., a distance of 40 miles.

QUEBEC & LAKE ST. JOHN.—An officer writes that this company has track laid and is pushing the grading work on the balance of its new line now under construction from La Tuque Junction, on the main line, 78 miles northwest of Quebec, west to La Tuque Falls on the St. Maurice river.

RAHWAY VALLEY.—Regular service was begun on August 6th over the new branch of this road from Aldene, a suburb of Roselle, N. J., to Summit.

ROANOKE & NORTHERN.—Incorporated in Virginia with $100,000 capital to build railroads. L. H. Vaughan is President; J. P. Wood, Vice-President; W. P. Huff, Secretary, and J. L. Vaughan, Treasurer, of Roanoke, Va.

ROCHESTER-CORNING-ELMIRA TRACTION.—Incorporated in New York to build an electric line 120 miles long from Rochester, N. Y., southeast through Monroe, Livingston, Steuben and Chemung Counties to Elmira. The directors include: M. H. Schultz, C. O. Greer, H. G. Abel, F. Eckstein and F. S. Breckingham, of New York City. The office of the company is 42 Broadway, New York City.

ST. JOSEPH & SOUTHERN.—This company has been incorporated in Missouri with $500,000 capital stock to build from St. Joseph, Mo., to Kansas City. The promoters say that the road will be double-tracked and will connect with the Union Terminal Company at Kansas City so as to give a connection with St. Joseph to those companies which now run to Kansas City but not to St. Joseph. The incorporators are: John Donovan, John D. Richardson, N. D. Biles, Edward C. Smith, James N. Burns, Henry Krug, Jr., J. G. Schneider and Jesse T. Roberts, all of St. Joseph.

ST. LOUIS, ROCKY MOUNTAIN & PACIFIC.—This company, chartered to build a line from Des Moines, N. Mex., west to Farmington in San Juan County, with a branch from Clifton House on the main line, north to Raton, has completed 80 miles of grading and laid about 40 miles of track. The bridge over the Red river has been completed and other bridges are under way. The Crow Creek branch is practically completed to the Koehler Mine, and coal shipments will be begun over this section of the line within two months. At this point about 200 coke ovens are to be built. Plans are being made for shops and roundhouses at Cimarron and this work is shortly to be started. (See Construction Record.)

ST. LOUIS, WEBSTER & VALLEY PARK.—Announcement has been made that $1,500,000 worth of bonds have been issued, securing the necessary money to resume work on this road. The Trust Company, of St. Louis County, is trustee. It is to be a double-tracked line from West End Heights, Mo., to Valley Park.

TENNESSEE RAILWAY.—This road has been extended from Winona, Tenn., southward to Montgomery Mills, 12 miles.

TEXAS & GULF.—This road has been extended from Timpson, Tex., southward to Walterman, 15.4 miles.

WESTERN OKLAHOMA.—Incorporated in Oklahoma with $6,640,000 capital to build three lines of railroad in Oklahoma and Indian Territory. One is to run from Lindsay in the Chickasaw nation, on the A., T. & S. Fe and the C., R. I. & P. northwest, touching the Santa Fe at Alston in Woodward County, Oklahoma. Another is from Oklahoma City to connect with the first line in Woodward County, and the third line is to run from Guthrie west to a connection with the second line at a point in the western part of Blaine County, a total of about 350 miles. Henry Ash and a number of Guthrie capitalists are said to be interested.

WYNNE, NEWPORT & WESTERN.—This company has applied for a charter from the state of Arkansas. This is to be a short line about 50 miles long to connect Wynne, Cross County, with Newport, Jackson County. Such a line would connect with the Cotton Belt at Fair Oaks, the Iron Mountain at Wynne and the Rock Island at Newport. The capital stock is $280,000, of which $90,000 has been subscribed. The officers are: O. N. Killough, Wynne, President; Isaac Goldman, St. Louis, Vice-President; W. H. Barnes, Wynne, Secretary; Sigmund Wolf, St. Louis, Treasurer, and M. M. Stuckey, Newport, Attorney.

YELLOW RIVER.—This road, which runs from Crestview, Fla., on the Louisville & Nashville via Laurel Hill to Florala on the Central of Georgia, 26 miles, and has been controlled but not operated by the Louisville & Nashville, is now operated as a branch of its Pensacola division.

RAILROAD CORPORATION NEWS.

ALAFIA, MANATEE & GULF COAST.—See Charlotte Harbor & Gulf.

ATCHISON, TOPEKA & SANTA FE.—With 8,445 miles operated the Santa Fe earned in the fiscal year closed June 30, $78,044,347 against $68,375,837 in 1905. Operating expenses increased less than $3,000,000, leaving net earnings of $29,546,829 against $22,858,453 in 1905, an increase of $6,688,376.

BALTIMORE & ANNAPOLIS SHORT LINE.—See Maryland Electric.

CANADIAN NORTHERN QUEBEC.—Under this name the Great Northern of Canada, the Chateaugay & Northern and the Quebec, New Brunswick & Nova Scotia have been amalgamated. The C. & N. has heretofore been operated under lease by the Great Northern. The total length of the roads in the new company is about 250 miles.

CHARLOTTE HARBOR & GULF.—This is the new name of the Alafia, Manatee & Gulf Coast. The company has taken over 7 miles of road between Brownville, Fla., and Liverpool, formerly owned by the Peach River Phosphate Mining Co., and is building an extension to Charlotte Harbor, on the Gulf of Mexico, 38 miles.

CHATEAUGAY & NORTHERN.—See Canadian Northern Quebec.

CHESAPEAKE & NASHVILLE.—See Louisville & Nashville.

CHICAGO & WABASH VALLEY.—It is reported that this road has been sold to Vanderbilt interests. It owns 24 miles of road from Kersey, Ind., on the Chicago, Indiana & Southern, to McCoysburg on the Chicago, Indianapolis & Louisville. It has no bonded debt.

CHICAGO, INDIANA & SOUTHERN.—See Chicago & Wabash Valley.

GREAT NORTHERN OF CANADA.—See Canadian Northern Quebec.

HOCKING VALLEY.—J. P. Morgan & Co. announced on August 1st the plan for the consolidation of the Hocking Valley and the Kanawha & Michigan. This provides for the formation of a new company (whose name is not given), the retirement of the preferred stock of the Hocking Valley, which is redeemable at par, and the creation by the new company of a general lien mortgage which is to provide for refunding outstanding equipment obligations and floating indebtedness, to furnish resources for betterments, improvements, and to be issued in exchange for the $11,000,000 Hocking Valley preferred stock. The common stock of the present Hocking Valley company and the stock of the Kanawha & Michigan are to be exchanged for stock of the new company. There are to be $30,000,000 new general lien 4 per cent. gold bonds maturing July 1, 1936. Of these, $17,000,000 are to be issued for use in connection with the consolidation, and $13,000,000 to be reserved for betterments and improvements and refunding. The new stock is to be $13,750,000, of which $11,000,000 will be exchanged share for share for the existing common stock of the Hocking Valley, $2,694,000 for $4,490,000 Kanawha & Michigan stock outstanding in the hands of the public, the remaining $56,000 to be exchanged for the $4,510,000 controlling Kanawha & Michigan stock, now held by the Hocking Valley. This covers the total $9,000,000 Kanawha & Michigan stock outstanding, the remaining $1,000,000 being treasury stock which is to be canceled. The rate at which Hocking Valley preferred stock is to be exchanged is $100 in preferred stock for $110 in new bonds. Kanawha & Michigan stock is to be exchanged at the rate of $100 in Kanawha & Michigan for $60 in new stock. Stockholders of the two companies have the opportunity on or before September 29 to agree to the consolidation plan.

ILLINOIS CENTRAL.—The gross earnings for the fiscal year ended June 30 were $51,636,405, against $49,508,650 in 1905, an increase of $2,127,755. The operating expenses increased $1,325,764, leaving net earnings $15,198,935, against $14,396,944 in 1905, an increase of $801,991.

See Indianapolis Southern.

INDIANAPOLIS SOUTHERN.—This road, now open for business, comprises a line from Indianapolis, Ind., southward to Bloomington, Ind., 56 miles, and the line from Effingham, Ill., on the main line of the Illinois Central, to Switz City, Ind., 89 miles, formerly operated by the Illinois Central. In other words, the Illinois Central, which controls the Indianapolis Southern, has transferred to that company the branch of its own line which will, on filling in of a 40-mile gap now existing, form the western end of the connection between Indianapolis and the main line. The President of the Indianapolis Southern is John C. Welling, Vice-President of the Illinois Central.

KANAWHA & MICHIGAN.—See Hocking Valley.

LOUISVILLE & NASHVILLE.—This company has acquired the Chesapeake & Nashville, a road operating 47 miles of line from Gallatin, Tenn., to Scottsville, Ky., including a 12-mile branch. In the year ended June 30, 1904, this company had gross earnings of $65,443 and net earnings of $8,964. No statement of capitalization is available.

The Yellow River Railroad, which runs from Crestview, Fla., to Florala, 26 miles, and has been controlled for some time by the Louisville & Nashville, but until recently not operated as part of the system, is now operated as a branch of the Pensacola division.

MARYLAND ELECTRIC.—The Baltimore & Annapolis Short Line and the Maryland Electric Railway Company have been merged under the name Maryland Electric Railways Company, which will have $1,200,000 capital stock. There is outstanding $350,000 stock of the Baltimore & Annapolis Short Line, and this will be exchanged for stock of the consolidated company at the rate of three shares of new stock for one of the old. An issue of $8,000,000 5 per cent. bonds of the new company will be authorized and one-half of this amount will be issued soon.

NEW BRUNSWICK RAILWAY.—This company, a subsidiary of the Canadian Pacific, has declared an annual dividend of 4 per cent. on the $3,000,000 outstanding capital stock. The rate last year was 2½ per cent.

NEW YORK CENTRAL LINES.—The gross earnings of this system in July are shown in the following table:

	1906.	Increase.
New York Central & Hudson River	$7,729,222	$593,924
Lake Shore & Michigan Southern	3,584,431	480,227
Lake Erie & Western	433,240	61,464
Chicago, Indiana & Southern	166,078	*1,599
New York, Chicago & St. Louis	808,722	139,894
Michigan Central	2,118,972	248,279
Cleveland, Cincinnati, Chicago & St. Louis	2,143,365	252,452
Peoria & Eastern	244,637	30,745
Cincinnati Northern	88,353	17,423
Pittsburg & Lake Erie	1,315,773	246,199
Rutland	249,924	19,501
Total	$18,882,627	$2,088,509

*Decrease.

PENNSYLVANIA SYSTEM.—The earnings of the Pennsylvania lines during the month of June increased so much as to partly offset the comparatively small earnings of April and May. It is evident that if the earnings for the next six months increase in proportion to the first six months of the current year the 1906 earnings will make new records, both for totals and for the increase over the preceding year. The gross earnings of the lines east of Pittsburg directly operated for the six months ended June 30 were $69,826,849, an increase of $7,852,000; net earnings, $19,537,246, an increase of $3,873,900. The gross earnings for this period of the lines west of Pittsburg and Erie directly operated increased $4,408,400, and the net earnings increased $1,766,600.

QUEBEC, NEW BRUNSWICK & NOVA SCOTIA.—See Canadian Northern Quebec.

ROCK ISLAND COMPANY.—The Chicago, Rock Island & Pacific gross earnings for the year ended June 30 were $51,237,858, an increase of $7,186,349. Operating expenses and taxes increased $4,030,750, leaving net earnings $14,538,909, an increase of $3,155,599 over 1905. These are not, however, the largest net earnings in the history of the company, as in 1903, with gross earnings of only $44,376,000, net earnings were $14,998,000. The 1906 mileage was 7,426 miles. The combined income account of the Rock Island and the Frisco systems, including the Chicago & Eastern Illinois, shows that with an operated mileage of 13,433 miles gross earnings for the year were $93,213,077 against $82,433,127 in 1905, an increase of $10,779,950. Operating expenses and taxes increased $6,200,000, leaving net earnings $28,173,747 against $23,599,265 in 1905, an increase of $4,574,382.

ST. LOUIS SOUTHWESTERN.—A meeting of the shareholders has been called for October 3 to vote on the guaranteeing of the principal and interest of an issue of not more than $4,000,000 first refunding and extension mortgage 5 per cent. 50-year bonds of the Gray's Point Terminal Railway, whose present bonded indebtedness is $500,000. The shareholders will also be asked to ratify an agreement with the same subsidiary road providing for the use of its property by the St. Louis Southwestern for 50 years, beginning August 1, 1906. The new bonds are improvements and extensions.

STILLMORE AIR LINE.—See Wadley Southern.

WADLEY & MT. VERNON.—See Wadley Southern.

WADLEY SOUTHERN.—This company is a consolidation of the Stillmore Air Line, running from Collins, Ga., on the Seaboard Air Line, to Wadley, 54 miles, and the Wadley & Mt. Vernon running from Wadley to Rockledge, 37 miles, with several extensions projected.

YELLOW RIVER.—See Louisville & Nashville.